MISCELLANEOUS REPORTS AND H.R. 7981

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CONTENTS

	Page
H.R. 7981	38
Report of—	
Anfuso, Hon. Victor L	17
Miller, Hon. George P	23
Quigley, Hon. James M	13
Sisk, Hon. B. F	11
Wolf, Hon. Leonard G	1
Teague, Hon. Olin E	19
Statement of—	
Hoff, William J., General Counsel, National Science Foundation	39
Mills, Thomas J., head of the Scientific Manpower Section, National Science Foundation	40

MISCELLANEOUS REPORTS AND H.R. 7981

MONDAY, JUNE 22, 1959

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met, pursuant to call, at 10 a.m., in room B214, New House Office Building, Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will please come to order.

This morning first thing we have a brief report from our colleague who has been over to Paris, France, to attend the aeronautical and astronautical show there.

Congressman, you state that you have interviews and reports, too.

Mr. WOLF. Yes, Mr. Chairman.

The CHAIRMAN. We have a very important session this morning but we have you scheduled too.

Mr. WOLF. What I might suggest, Mr. Chairman, is the tape-recorded interviews we could use later in the week.

The CHAIRMAN. All right, let us do that.

Mr. WOLF. I could present the interview; we have transcribed them for the record. Then if you want to hear them——

The CHAIRMAN. I understand your office workforce worked over the weekend diligently and hard on this and therefore we want to hear them.

REPORT OF HON. LEONARD G. WOLF, REPRESENTATIVE OF THE STATE OF IOWA

Mr. WOLF. Thank you, Mr. Chairman.

Well, it gives me a great deal of pleasure to report on my trip to Paris to attend as a member of this committee the 23d Aeronautique Salon at Le Bourget Airport. I shall try to be brief and factual.

The trip was made via MATS and I left here Wednesday afternoon, June 10, and arrived back in Washington at approximately 8:30 Monday morning, June 15.

On my arrival in Paris, I was met at the airport by Captain Knudsen, of the U.S. Air Force, and Col. Ross Powell, briefing officer at EUCOM headquarters. As we drove to my hotel, the Carillon, Colonel Powell gave me the briefing which I would otherwise have had to take other time to get.

As soon as I had checked in at the hotel, we proceeded to the air show. At the show I was met by Colonel Robinson of the U.S. Air Force, who outlined the purposes of the show and why U.S. military forces were represented there.

I was next introduced to Mr. André Granet, president of the Aéronautique Salon Committee, who was scheduled to pull the

switch which would raise the Atlas and the giant Redstone on their launching pads on the grounds. Here are two pictures taken at this time.

Mr. Chairman, it was an impressive sight to see among manufacturers from all over the world so many of our great American corporation names and their displays at this show.

The U.S. Army and Air Force had magnificent displays. The Air Force had a beautiful display on aero space medicine. They even had the two little mice, with transistor radios on their backs. This seemed to fascinate greatly the French people. It was very interesting to watch these people talking excitedly in French as they watched this great American display, demonstrating peaceful uses of outer space, and our entire aero space exhibit in which there were beautifully done mockups of the first flight to the moon and return. All the words were in French and the various mockups told the story in French.

Directly in front of the large hangar housing our aero space display were two of our large cargo-carrying Air Force planes in the C–130 class.

Sitting almost under the wing of one of these aircraft was the Russian exhibit which consisted of only two aircraft. The crowd around these two planes was tremendous, however. People would wait in line for as long as 20 minutes, or more, to see the interior of these two Russian aircraft. I know that several Frenchmen expressed the opinions of many when they commented that Russia is doing so much in space research, and that they were quite surprised that Russia did not have a larger display there. Frankly, they were impressed by our display.

There were missile displays of some of the NATO countries. I had hoped to have a complete detailed report of the various missiles on display there, but the report has not yet arrived at my office.

I had a very lengthy briefing by Colonel Griffith of NATO Headquarters on the mechanics of the NATO organization. Part of this was classified material. If the committee is interested, I have about 45 minutes of this briefing on tape, but I didn't feel that the whole committee would want to hear it at this time.

While I was at NATO Headquarters General Norstad came in, and I visited with him for about 30 minutes during which time I interviewed him regarding the controversy with the French on atomic stockpiling. I think this will be of interest to the committee, and I have a transcription of that interview with me, as well as my tape recorder with which to play the 7 or 8 minute recording with General Norstad, if the committee wishes to hear it.

A tape recording was made, also, of an interview with Lt. Gen. T. B. Larkin, U.S. Army (retired), director of the mutual weapons development team, Hotel Tallyrand. General Larkin works directly with Dr. York. He discussed with me our research and development work in the European theater, a transcript of which I have with me. General Larkin gave me a brief explanation of the Terne antisubmarine weapon system which was developed by the Norwegian Defense Research Establishment and the Royal Norwegian Navy, with the help of the U.S. mutual weapons development program. I have a booklet on this system, which I would like to pass around.

General Larkin made some very interesting comments regarding the Fiat G–91 aircraft, which has been selected as the defensive weapon of NATO. The reasons for its selection were based on two major advantages:

1. Capability of operating from semiprepared or grass airfields, thus dropping the traditional, long, expensive, and vulnerable permanent runways.

2. Lightweight and reduced dimensions, evidently connected with the importance of the mission to be performed and with the availability of a sufficiently small engine with adequate thrust.

General Larkin outlined several of the research and development installations where research is going on at present, and promised to send a detailed statement to me, listing all of the research and development locations in Europe. I am sure that this would be of interest to the committee for future study. I was interested to learn that at The Hague the research and development installation has 55 scientists working constantly on projects.

Another item which General Larkin mentioned was the newly developed French field radar system which can pick up a man on a dark, foggy night as far away as 7 miles and a horse as far away as 14 miles and distinguish the difference. He suggested that the French are excellent inventors, but do not have the German knack of productive ability. He mentioned that it is actually cheaper to do much of this research in Europe than in the United States, and that we should never discount the opportunity to mass the brains of the free world in the cause of research and development.

On Saturday morning I paid an official call on Ambassador Burgess to NATO, and while I was there I visited with Dr. Norman Ramsey, scientific adviser to NATO. Dr. Ramsey presented some interesting thoughts on research and development and offered whatever help he could give to our committee. I have with me a transcript of these interviews as well as the tape recordings, if the committee wishes to hear them.

I spent the afternoon at UNESCO Headquarters. The work of the United Nations Educational, Scientific and Cultural Organization may have little to do with this committee, Mr. Chairman, but I felt that you would be interested to know that UNESCO is having a scientific conference at the present time, and I have been promised a report on the conference, which I felt would be of value to the committee.

While I was in Paris, I was flown across the city in the new Bell helicopter, an all-new turbine-powered helicopter for all-weather operation, equipped to handle about 10 passengers. I also rode from the heliport to downtown Paris to LeBourget Airport in the new Sikorsky helicopter, and had the thrilling experience of meeting Igor Sikorsky, who sat next to me in the 'copter. I saw a demonstration of the T–37, the new Cessna jet trainer, and flew in it. It is an excellent training device for our new Air Force. This plane travels at about 390 miles per hour and will be used immediately by the new air cadet. They can solo in it after 5 hours instruction.

If there are any questions, I should be very happy to answer them.

I would like to say one final word about the importance of NATO. I was tremendously impressed with the change which has taken place in Paris as a result of the growing confidence in NATO. Two years

ago it seemed like a city just beginning to awaken from a lengthy slumber. Today the city is industriously rebuilding itself, in the confidence and knowledge that American military might is backing up the European will to resist the Communists. These were my first impressions, and they were borne out by the statements made by the gentleman who briefed me at NATO headquarters.

There is no question in my mind about the need for NATO. I was quite impressed with the communications system they have developed, and wish that I could explain it in more detail. But I will only say at this time that it is almost foolproof electronically and that the farthest bases in the NATO complex have immediate communication, even under the most difficult wartime stress, with the Supreme Headquarters NATO.

If there are any questions, I should be very happy to answer them. I thank the chairman and the committee for their courteous attention.

I have a little literature to the T–37 that maybe it would be well to pass around, on the Bell aircraft, and the 10 years of Atlantic cooperation. I also have a New York Herald Tribune edition dedicated to the 23d Paris Aviation Show that the committee may like to look at.

The CHAIRMAN. I want to thank you very much, sir, for the fine report you have made. We designated one Representative from each side, one Democrat and one Republican. Our Republican colleague could not go. However, I have had a private report that they were very well pleased with the representation at Paris that we had.

Now I would like to know this: This afternoon could you show your interviews there on the screen?

Mr. WOLF. Mine is strictly a tape recording with my little tape recorder, which I think my secretary has.

The CHAIRMAN. Could you meet us this afternoon in the committee about 2:30?

Mr. WOLF. If the members want to hear it.

The CHAIRMAN. Who from the committee can be here this afternoon to hear the recordings made there in Paris by our colleague who represented us there? I call for a raising of hands. There is not much on the floor today. Can any of you folks be here at 2:30?

Mr. SISK. Mr. Chairman, it might be possible, but I cannot say.

Mr. QUIGLEY. I would find myself in disagreement with the chairman about not being much on the floor today if H.R. 3 is coming up.

The CHAIRMAN. Is it coming up this afternoon?

Mr. SISK. That is my general understanding, Mr. Chairman, and that is why I would not want to commit myself at all.

Mr. WOLF. These could be mimeographed and I think they could be sent around. I do not have the staff personnel to do it but it is possible in the course of the week that the committee could take care of it.

The CHAIRMAN. Let us send it out by mimeograph, then. Mr. King.

Mr. KING. I wanted to make the statement, Mr. Chairman, in view of the relatively short period Mr. Wolf was in Paris and in view of the tremendous amount of ground which he covered, the very valuable information he brought back, I think it is quite evident that Mr. Wolf used his time most constructively. I think he is to be commended for a splendid and valuable report to this committee.

The CHAIRMAN. Fine. Thank you. We are glad to have such tremendous representation overseas. Thany you, Mr. Wolf.

(The following was submitted for the record:)

INTERVIEW WITH GEN. LAURIS NORSTAD, SUPREME ALLIED COMMANDER, EUROPE, SHAPE HEADQUARTERS, PARIS, FRANCE

Mr. WOLF. We are at the Supreme Allied Headquarters in Europe, in the briefing room, and in the course of events we are discussing the reaction in the various press to the controversy with the French on atomic stockpiling. General Norstad, would you like to tell me what has been the general reaction?

General NORSTAD. We feel here that it is rather unfortunate that this particular subject—the question of the possible status of some of the squadrons based in France, has been given so much publicity. Actually the least we can say is that it is rather premature, and at most it could be perhaps completely inaccurate. But it has become something of a public issue, and is found on the front pages of all the press throughout NATO Europe. And I should say that the press, generally, including the French press, maybe particularly the French press, is very sympathetic and understanding to the requirements of the alliance.

Mr. WOLF. This is quite interesting in light of what we have been getting in the press in the United States in the last few days, you know.

General NORSTAD. I think the American press—and I have just come from America where I was the first 2 days of this week—I think most of this comes from reporters over here and it is digested, and is rather restricted in its scope. But reading the full play of the European press, including the French, I am very favorably impressed with the fact that there is so much understanding, which I would expect, but I am pleased to see it—so much understanding of the NATO requirements.

Mr. WOLF. I am glad to hear that. I think it is very important that we have agreement with the French, especially in view of the fact that the headquarters are located here. Otherwise, it could become very awkward. I noticed here this morning, if you don't mind, General, your comment about withdrawing some 200 American fighter planes from the French bases because of this French refusal. Is this tentative?

General NORSTAD. Well, this is actually largely speculation. There are still fields of negotiation and discussion or agreements which have not been completely covered with the French Government, and some of these agreements would bear on the ability of our forces to operate freely and effectively, and this does raise a question of what is necessary to make them effective. In case these agreements cannot be completed, or completed the way we feel they must be—so that has given rise to this suggestion that the units might possibly have to be moved. But I would say to say anything about it at this particular time would be really quite premature.

Mr. WOLF. I take it, then, that you are optimistic that this thing will be resolved in a satisfactory way and eventually we will be back in as good a shape as we were.

General NORSTAD. I can only say this: That regardless of where these particular squadrons may be located, or may have to be located, in order to make them fully effective, believe me, they can and will remain fully effective on bases here in Europe. I have the fullest confidence of the dedication of France, for instance, to the alliance, and I am confident that in the long run what may be differences of opinion will be ironed out.

Mr. WOLF. I want to thank you, General Norstad, for the time you have given me this morning. I understand that you are leaving for Britain today to go over to some special function. Do you have time to discuss that?

General NORSTAD. Yes, I am leaving in a few minutes to go to London, to witness tomorrow morning the trooping of the colors, where the guards regiments parade in front of the Queen, who is dressed for the occasion in her uniform as a guards colonel. Then, tomorrow night I will take the salute at what is called the royal tournament, which combines horse riding activities with something that might be called a pageant, and one of the high points in that occasion is someone takes a salute, and I have to do that tomorrow night.

Mr. WOLF. Sounds to me like you are a public relations man—par excellence, too. This has been General Norstad, Supreme Allied Commander, Europe, at SHAPE Headquarters in Paris, France.

INTERVIEW WITH AMBASSADOR W. RANDOLPH BURGESS, NATO, HOTEL TALLEYRAND, PARIS, FRANCE

Mr. WOLF. We are in the office of the Ambassador to NATO, Dr. Burgess. Dr. Burgess is from the Middle West. He has been a banker in New York City, and has done a very fine job here as Ambassador to NATO. I think that without any further introduction I will just say that it is very nice visiting with you Dr. Burgess. May I say that you have been very kind to me here—the people in NATO yesterday, and your officials here in the building.

Ambassador BURGESS. Well, we are delighted to see you, Mr. Congressman. We just welcome American visitors. Because we do want those people to understand what we are trying to do. We need their support and help.

Mr. WOLF. Just a plug for the Middle West. It is quite impressive for me to find within the last couple of days that we have real leadership here. You are from Illinois, and General Norstad from Iowa and Minnesota. We have the Middle West pretty well involved in the defense of Europe and in the defense of the free world.

Ambassador BURGESS. It is a good place to come from.

Mr. WOLF. Mr. Ambassador, would you like to tell me something of your duties here? And your responsibilities?

Ambassador BURGESS. Well, I represented the United States at the Council of NATO, which is the military alliance of 15 countries, which was organized back 10 years ago for the purpose of stopping the Russian takeover of Europe. Russia had taken over Czechoslovakia, and she had a blockade of Berlin, and she was reaching out. And, so, we organized this alliance, and since we organized it we haven't lost an inch of territory to the Russians. Now, the United States plays a very important role in that alliance. We have some very fine troops in Germany, and we are helping these countries to equip their troops with modern weapons, and we are helping with the training, and we sit at the NATO council table because NATO is in a sense the board of directors of the alliance.

Mr. WOLF. I think what you say—the fact that the Russians haven't been able to take over a single country since the arrival of NATO—certainly proves the effectiveness of NATO. I wonder if you have thought seriously about the need perhaps for a NATO for the Far East and a NATO for South America.

Ambassador BURGESS. Well, of course, we have SEATO, which is the alliance of southeast Asia, and there is, of course, the Baghdad Pact. We don't like that name very well now since the trouble in Iraq, but that is the group with Turkey, Iran, ourselves, and the British which studies those questions of the Middle East. Now as far as Latin America goes, we have a very close association with the Organization of American States. So, in a sense, we have pacts which cover a good part of the world.

Mr. WOLF. Ambassador Burgess, I am just wondering in light of the fact that in this coming week in the Congress we are going to be debating the mutual security program, do you feel that there is any new or different direction in which we could go today from where we were going 5 years ago, in our mutual security program?

Ambassador BURGESS. Well, I would hesitate to say too much about a change in direction. One assumption which people make is that the military matter is a stalemate and we can let that ride along and move over and think altogether about economics. Well, I am all for thinking about the economics of the world situation, but we must remember that we have a tremendous military problem here, and we are engaged right now in a very difficult negotiation with the Soviets, and it is our military strength which enables us to talk firmly. The Soviets will take adavantage of any weakening in our military strength. And it isn't just weakening either. They are moving ahead very fast with new atomic weapons. They are going to have a new ICBM, very soon, and if we don't have them at the same time, and if we don't also see that our European partners have atomic weapons we are going to find ourselves behind the eight ball. So, we must keep up our spending on the military. We mustn't kid ourselves about that.

Mr. WOLF. I know there are going to be some forces hard at work to whittle away on this thing.

Ambassador BURGESS. Exactly.

Mr. WOLF. And, of course, I know this is the popular direction to go in America today. This is one of the reasons why I was anxious to have the opportunity to talk with the NATO people while I was in Europe.

Ambassador BURGESS. I hope our people won't lessen, in any way, the amount of funds we make available for NATO, because we are the big boy in this partnership, *and we have to do our share—up to the hilt.*

Mr. WOLF. Well, it has been wonderful visiting with you, Mr. Ambassador, *and I am very happy* to know again that the civilian leader to NATO is a midwesterner.

Ambassador BURGESS. Well, I am delighted that you are here. I am delighted that you are working on research and development because in this atomic warfare—this modern warfare—research and development is the key to it.

Mr. WOLF. *This has been an interview between Congressman Leonard Wolf* and Ambassador Burgess in the Hotel Talleyrand in Paris, France.

INTERVIEW WITH DR. NORMAN RAMSEY, SCIENTIFIC ADVISER TO NATO

Mr. WOLF. We are still in the office of Ambassador Burgess, and we have been visiting concerning some of the various problems affecting the United States in the NATO nations alliance, and Dr. Norman Ramsey has just entered the room.

Ambassador BURGESS. I would like to introduce you to Congressman Leonard Wolf, who comes from Cedar Rapids, Iowa, and is a member of the House Subcommittee on Research and Development. So, he is interested in the subjects in which you are interested.

Dr. RAMSEY. Fine. Fine. I am very interested in it, and I think this is a very relevant group to which to report some of our activities.

Mr. WOLF. We are vitally interested, of course, in the question of what direction the weapons of the future are going to take, and perhaps what the peaceful uses of outer space will be, and things of this kind. I came over here to attend the Le Bourget airshow.

Dr. RAMSEY. Oh, yes.

Mr. WOLF. Would you like to tell me a little about your work?

Dr. RAMSEY. I have been a science adviser at NATO during the past year and a quarter now. This is a position newly established at NATO, established at the heads of government meeting in December of 1957. Shortly after the furor over sputnik, and the worry about lack of certain adequate corresponding developments in the NATO countries, and this position was established, and also a NATO Science Committee was established at the same time. We have been extremely busy subsequently.

Mr. WOLF. What is the difference between your position and General Larkin's, for example?

Dr. RAMSEY. There is a very important difference. That is, that I am working for NATO, the international organization. I am on the international staff. Although I am an American citizen, I am really responsible to Mr. Spaak, the Secretary General of NATO, not to the United States.

Mr. WOLF. Specifically, what have been your findings?

Dr. RAMSEY. We have made a number of important findings; namely, that there really is a strong need for greater cooperation among the European nations, and including the United States as well—the NATO nations—in research and development, both in the defense field and in pure and applied sciences. What we have been trying to do is to stimulate an increased amount of this activity, and I think so far this is really going very well. We have had excellent support from the NATO Council, particularly in the last couple of weeks. They have been very favorable to all of our proposals, ranging from oceanography on up and down in fields which require cooperation and need it. I could indicate what some of these are. Typical of things that are already agreed, indicating their rather wide scope, is that there exists already an exchange fellowship program for training scientists, which is of quite considerable magnitude. Particularly, in some of the countries, this is enabling them to increase by factors of four or five the number of scientists trained in other countries. It is a mutual program between the different countries. There is the support of certain so-called advanced study institutes where there are special fields where the degree of specialization is so high that a single country cannot have an adequate school, the countries can pool their resources together and have an extremely good one. We have been supporting this kind of activity. We have now approved a program of making grants to support cooperative research activities. Agreements, particularly in certain fields, I think are going to be a large fraction of our future

activities—fields like oceanography, where, due to the fragmentation of many of the countries, the small individual countries; for example, Norway has some excellent oceanographers. The study of the North Atlantic Ocean is of extreme importance both for pure science and——

Mr. WOLF. Maybe the folks would be interested—pardon me, Doctor—in knowing exactly what is oceanography?

Dr. RAMSEY. Oceanography is a study of the ocean. After all, the largest part of NATO, and it is included in the name of the organization, is the North Atlantic Ocean and also the Mediterranean, and we know very, very little about it. All of our countries are thoroughly explored. The amount of exploration of the ocean so far is very minor, and it is mostly concerned with hunting for fish. And there are many—there is great wealth in the ocean which we have to learn how to use. The recent developments in submarines really make this possible.

Mr. WOLF. I was just going to say, I think we would find that Russia is doing a considerable job of exploring the bottom of the ocean.

Dr. RAMSEY. That is exactly true, and you can see that is one of the reasons why we need a cooperative NATO activity in this because, for instance, the biggest and most expensive oceanographic research vessel studying in the North Atlantic Ocean at the present time belongs to Russia. Neither did the United States nor any other country—any NATO country——

Mr. WOLF. And Russia does not exactly belong to NATO.

Dr. RAMSEY. And Russia certainly does not belong to NATO.

Mr. WOLF. This is very important work. They are just now beginning to get really serious about it, I think, in Washington—the importance of oceanographic study.

Dr. RAMSEY. It is clearly a field that needs cooperation. For example, Norway alone has excellent scientists in this field, but they can afford only a small ship, which is fine for studying along the Norwegian fiords, but it would probably sink if it went out into the Atlantic. But if the nations pool together, then cooperatively they can have really an effective oceanographic research vessel and program.

Mr. WOLF. Have you had any interesting scientific breakthroughs, which made the study of oceanography easier, in the last few years?

Dr. RAMSEY. Oh, yes. I think there are a number. One of the major breakthroughs has been atomic-powered submarines—submarines which can go for long periods of time underwater. This not only, I think, is a breakthrough that makes possible greater studies, but it also makes them valuable because it means you can take advantage of what you learn. It wouldn't surprise me but what eventually, for example, you might be tapping mineral resources in the ocean with techniques now developing.

Mr. WOLF. I can't help but be impressed here in the last couple of days with how much the art of warfare—if you can use that word, and I am hesitant to use the word "art"—has changed even in the last 20 years, and the importance of the work of people like Ambassador Burgess and you. Of course, there is no question, we are involved in a war every day—in a psychological war. Well, let me say, Doctor, it was nice having you drop in here while I was here.

Dr. RAMSEY. Well, I am very happy to have talked with you a little bit. I might say one word, incidentally, of one thing about which you haven't said much. That is, of course, one of our major activities and is rather directly on the field of defense research. Where again there is the necessity for the countries to cooperate in sharing their abilities. Some of the best scientists are in Europe in this field, and we can't afford not to use them.

Mr. WOLF. That is an excellent point, Doctor, and I thank you very kindly.

INTERVIEW WITH LT. GEN. T. B. LARKIN, RETIRED, DIRECTOR, MUTUAL DEVELOPMENT WEAPONS TEAM, HOTEL TALLEYRAND, PARIS, FRANCE

Mr. WOLF. I am in the office of Lt. Gen. T. B. Larkin, retired. He is Director of the Mutual Development Weapons Team. We are up on the fourth floor of the Hotel Talleyrand. General, what do you say is the name of this location?

General LARKIN. This is the U.S. regional defense office for Europe.

Mr. WOLF. For the sake of the folks back home, I thought I might ask you a few questions, General Larkin. Maybe you could tell us a little bit about the type of work you are involved in here. I understand that you work with Dr. York.

General LARKIN. That is true. I am the Director of the Mutual Weapons Development Team, which has been engaged here in Europe for the past 4 years in assisting the various Western European countries in the research and development of military end items. What we have in mind is to take advantage of the scientific and inventive talent there is here in Europe and put it to better use so that these items can be developed, thereby, improving the defenses of Western Europe and, at the same time, to improve our own defense.

Mr. WOLF. I was very interested in the comments you made in regard to the inventive genius of the Italian people, for example, this new Fiat aircraft you mentioned.

General LARKIN. They have done very well with the Fiat aircraft. They have developed the airplane and that has been combined with the jet engine developed by Bristol. These two have been married together, and Fiat is the prime contractor.

Mr. WOLF. I was interested in your comments on this standardization. I know this was one of the great problems during the Second World War—the fact that in many cases the problem of ammunition proved to be a very difficult thing. We had guns but no ammunition, or we had ammunition but no guns. We didn't have standardization at that time. I am glad to see that you are moving in that direction. Do you have any comments you would like to make along that line?

General LARKIN. Yes; I have experienced that very thing during the past war in Italy. The British had a gun which corresponded to our 75 millimeter. They ran out of ammunition but could not use ours, and consequently their guns were useless. Changes have been made since then, desirable changes, for example, the new NATO light rifle. Although there are several styles of those, and the parts are not interchangeable, the main point is that the ammunition is common and is interchangeable. With England and Canada, the United States has engaged in standardization ever since the war. A military committee in London is engaged in that, and it has accomplished a great deal. Likewise, these items which are developed with U.S. assistance here in Western Europe are made available by the country which develops the item to various other countries, including the United States, and the mere fact that other countries adopt these items will bring about considerable standardization.

Mr. WOLF. I think that is a good point. You mentioned in the discussion here the communications standardization. I was quite fascinated by that, too, General. Would you like to elaborate a little bit?

General LARKIN. Yes. In war and most any other time, also, one is in a very bad situation if he cannot communicate. In time of war it is absolutely essential. During the last war that was one of our most serious problems. But at the present time, through the various agencies here in Western Europe, and we are assisting it in, there is being studied and being effected greater standardization of communication equipment.

Mr. WOLF. I wish it were possible, if it weren't classified, to discuss some of this new communications equipment. I know we can't get into that. But I assure you that I am really thrilled by the new developments about which I have learned since I have been here in Europe. I enjoyed your comment. Many people seeem to think that "it's made in America" philosophy is paramount, and I was tickled to hear your comment that it is a mistake not to use this inventive genius. Would you like to develop this idea that perhaps we don't recognize enough the inventive genius of the world?

General LARKIN. I think, considering the situation which is now facing us, we should, to the maximum, take advantage of the research and scientific talent which is here in Western Europe. In some respects these countries are really ahead of us, and, to my mind, it would be a serious mistake not to take advanage of this talent.

Mr. WOLF. You commented about the psychological advantage. I thought that was an excellent point. Would you like to develop that idea?

General LARKIN. Yes. If there is an item which is developed in Western Europe and we do not have such an item, I think it is advisable for the United States to adopt such an item. Not only does it give a psychological pat on the back to the country whose item is being adopted, but also the other countries see what we are doing. Furthermore, the countries over here in Western Europe have to buy equipment from the United States. For that they must pay dollars. They can't get dollars unless they can sell us some of the equipment which they have developed.

Mr. WOLF. Well, right now we have a dollar problem developing in America, and I am glad to hear that point brought out. I noticed in our discussion here this afternoon you referred to the Marshall plan. Would you like to tell me what you feel the result has been of the Marshall plan?

General LARKIN. Yes, I was over here during the war, and for some time after the war, as well as making a number of visits. Immediately after the war the various manufacturing plants of Western Europe were very much destroyed by bombing and by retreating armies. The countries of Western Europe were in a very bad state, economically and industrially. Through the Marshall plan, equipment was provided for their factories and these countries were then able to move ahead.

Mr. WOLF. I certainly wish we could spend more time discussing this, General, but let me say I am grateful for the time you have given me this afternoon, and I hope we will have the opportunity to visit together again.

General LARKIN. Thank you.

(Whereupon, the committee proceeded in executive session.)

MISCELLANEOUS REPORTS AND H.R. 7981

TUESDAY, JUNE 23, 1959

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 12 o'clock noon, Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. We have a few moments left here and we can therefore take up one or perhaps two subcommittee reports.

Mr. Sisk, are you ready with your subcommittee report?

REPORT OF HON. B. F. SISK, REPRESENTATIVE OF THE STATE OF CALIFORNIA

Mr. SISK. Yes, Mr. Chairman.

We have a very brief report here on the results of our subcommittee hearings on June 11 and 12, if you would like to have me quickly read this.

The CHAIRMAN. Yes.

Mr. SISK. Mr. Chairman, Subcommittee No. 4, Space Problems and Life Sciences, held hearings on June 11 and 12 to become informed on the status of scientific research and development as conducted by the Air Force.

On the first day we received testimony from Dr. Joseph V. Charyk, Secretary of the Air Force for Research and Development, and Lt. Gen. R. C. Williams, USAF, Deputy Chief of Staff for Development.

Dr. Charyk explained in considerable detail the major aspects of his responsiiblities, beginning with the philosophy and history of his organization. He outlined the scope of his position as it concerns the creation of policy and general research objectives, providing liaison with the Secretary of Defense, National Aeronautics and Space Administration, the Congress, and other agencies having an influence on Air Force Research and Development such as the Office of Director of Research and Engineering of the Defense Department, currently under the guidance of Dr. Herbert A. York.

The Secretary described in detail the economic factors involved, including capital investment, overhead, costs, and engineering and development expenditures amounting to almost $3 billion.

Following Secretary Charyk, General Wilson gave his prepared statement, which was concerned primarily with research activities at Headquarters, Air Force level as they pertain to his responsibility for planning, directing, and controlling the Air Force programs. General Wilson's job is to establish overall objectives, policy and guidance, create and maintain working relationships with other re-

search and development agencies, both in this country and abroad, determine resources requirements and availability, and to maintain a balanced research and development effort responsive to the needs of the operational forces.

Following General Wilson's statement, the subcommittee members questioned both witnesses, exploring in greater detail those areas of research and development which has been of prime concern to the committee, particularly matters relating to funding, manpower, operational needs for research products, and so forth.

Both witnesses were very communicative and eager to cooperate with the committee in explaining the work being undertaken by respective organizations.

On the second day, June 12, the subcommittee heard testimony from Lt. Gen. Bernard A. Schriever and his staff.

General Schriever, lately the commander of the Air Force Ballistic Missile Division, and newly appointed commander of the Air Force Research and Development Command, brings to his new post a wealth of experience as an operational commander who has been concerned for many years with research products evolved from Air Force programs that have enabled him to carry out his responsibilities.

This, it seems to the subcommittee, is a fortuitous continuity of experience that should be extremely valuable to the Air Force research programs, particularly those concerned with ballistic missile development.

General Schriever went into considerable detail in describing the organizational structure under which Air Force research and development programs must operate, and the chain of command within which the Air Research and Development Command must function.

Questioning by the subcommittee members was vigorous and direct; General Schriever's open and candid presentation was very helpful in aiding the members to visualize the complex organization and channels of communication.

Mr. Chairman, the members of my subcommittee believe that our hearings were extremely profitable, permitting an opportunity to understand the full scope of what is involved in the largest single research and development program in operation today, and to realize how dependent is the security of this Nation and the free world on the quality of the effort being conducted within or under the direction of the Air Force.

It would require many weeks of study for the subcommittee members to fully explore definitively the full extent of Air Force research and development. But it is believed that in general terms, the subcommittee now has a grasp of the breadth and depth of the research that is maintaining the Air Force posture as the major retaliatory force of our Armed Forces.

The subcommittee would like to commend the candid cooperation of the witnesses who appeared before us. Further, the subcommittee would like to recommend that such hearings as we have just completed be continued, in order that members of the full committee can be kept apprised of the current status of research and development not only in the Air Force but in the other military services as well. In this way, the full committee can significantly assist the progress of research and development undertaken by Government agencies that

will provide us with greater and greater national security and preparedness.

Thank you, Mr. Chairman, for the opportunity of making this report.

The CHAIRMAN. Mr. Sisk, that is an excellent report from your subcommittee.

That is the first subcommittee we have heard from. I hope that the standard of reports of the other subcommittees maintains as high a level as you have presented in your report, and I suggest that we give that, Mr. Ducander, to the press, and if you have already made available extra copies, that we send all of the members of the full committee, those that are not present here, a copy of this subcommittee report, so they can see what a subcommittee can really do in the way of helping the full committee in rendering a very valuable report.

Mr. SISK. Mr. Chairman, if I could add for the record—and I certainly do want to do this—that a major portion of this we were able to achieve because of the very fine and cooperative work of the staff, because they did an excellent job, and I want to commend particularly Mr. Hines for his assistance in helping this thing.

The CHAIRMAN. Fine.

Now, Mr. Quigley, do you have a report?

Mr. QUIGLEY. Yes, Mr. Chairman, I have a report here from subcommittee No. 1.

Mr. Miller is the chairman.

At the time the hearing was held, Mr. Miller had to be in California in connection with another committee assignment.

The CHAIRMAN. Mr. Miller wants you to recommend this other committee in making the report?

Mr. QUIGLEY. Yes, because I actually served as chairman of the committee.

REPORT OF HON. JAMES M. QUIGLEY, REPRESENTATIVE OF THE STATE OF PENNSYLVANIA

The report is as follows, Mr. Chairman: Subcommittee 1 heard witnesses from the Advanced Research Projects Agency on Research and Engineering on Wednesday, June 9, 1959.

The committee heard Mr. William H. Godel, Director of Policy and Planning, and Mr. George P. Sutton, chief scientist, on the more recent developments in the field of research and development, not only in the technological development of the military but also on the economic ramification of peaceful civilian scope of the space technological achievements.

ARPA, as you know, has the responsibility of centralized vantage at the highest level, and it was created in order to avoid unnecessary duplication and to establish the high priority called for in the highly specialized and extremely important job of space research and development. This responsibility can be exercised effectively and economically only by selecting with utmost care the extremely high cost programs and projects so as to make maximum use not only of the time element involved but also of the supply of technical development, material resources, and funds required to achieve the ultimate goal.

The witnesses indicated that at the present time ARPA has under contract approximately 40 scientific personnel. ARPA has been assigned expanded functions in the field of missile defense, and it is felt that presently there are insufficient scientific personnel under contract to properly do the job assigned the Agency. This tight personnel problem is, it is felt, only temporary in that the task assigned by the Secretary of Defense had been expanded immediately preceeding the hearing held on June 9.

Administrative and secretarial personnel assigned ARPA are approximately 30 in number.

ARPA is an organization entity in the defense setup which specializes in resolving a particular problem and in reducing the unknowns in the research and development area to proportions that will enable the Secretary of Defense to then assign the problem to one of the defense agencies, which in turn will be charged with the problem of placing into operation ARPA's development.

ARPA is charged with the management of research and development in the following three areas:

(1) Military space technology;
(2) Ballistic missile research; and
(3) Solid propellant technology.

In order to solve the problems arising under the three broad project areas, ARPA uses five different types of research and development effort, and they are as follows:

(*a*) Fundamental research;
(*b*) Applied research;
(*c*) Development of critical components;
(*d*) System feasibility demonstration equipment; and
(*e*) System study.

Stated simply, fundamental research, otherwise known and generally referred to as basic research, is an effort to reach a goal which is beyond the limits of present human knowledge. It is the expectation to discover something new in knowledge, concept, or principle, which will lead to a better understanding of what is going on in the research area.

ARPA feels that this category is the most interesting of the five referred to above and is, by and large, more fundamental to the true concept and purpose of ARPA than perhaps any of the remaining fields.

Some interesting examples of work done in this category are in high-temperature thermochemistry. These studies are in the main theoretical studies of the properties of chemical formations suitable for rocket propellants, and they are currently being conducted by ARPA at the University of Chicago, Ohio State University, Vanderbilt, and the University of Wisconsin.

Many of the projects being conducted are of purely experimental nature, with the expected hope that they will produce new formations which in turn could be used to measure new synthetically formed chemicals which may be proved suitable for rocket propulsion.

ARPA is also sponsoring some research in photosentitive materials for photovoltage cells, which eventually will be used for converting solar energy into usable form.

They are also working on certain cheap organic materials for this purpose.

ARPA is presently supporting the development of a special hypersonic blowdown tunnel which will be capable of mach 15 for durations as long perhaps at 20 seconds. This, of course, is much longer in duration than conventional hypersonic tunnels and will therefore permit the evaluation of reentry physical phenomena.

This work is being done at Cornell Astronautical Laboratory and should give air stagnation temperatures above 8,000° F., and perhaps as high as 14,000°, by the use of lightweight gases.

In the applied research area, ARPA has a number of contracts, each concerning formulation of a different approach to solid propellants. It is presently accepted by chemistry that solid propellants can be improved in present performance by approximately 20 percent. Such performance is essential in order to double the payload capacity of certain missiles and certainly is required if solid propellants are to become more suitable for space flight and missile missions.

In the field of applied research, ARPA has contracts for certain studies to study heat rejection mechanism in space-borne radiation. This includes the effect on special surface coatings and the mechanism of condensing vapors in a vacuum as well as the effect of radiator geometry and orientation.

In the third category, the development of components, falls the contracts for design and construction of experimental phases of hardware which, if proven successful, can at a later date become an integral part of the flying units of already established basic principles.

In this category some various radiator devices, components of various plasma-type propulsion systems, and the development of systems used in electrostatic or eletromagnetic fields are used to accelerate the ionized fluids of plasma.

In the system's feasibility type of research is found the demonstration of various components of an experimental system which demonstrates that they are properly matched to accomplish the desired result. For example, in a delayed repeater communications system, the system contains several ground-tracking stations, a number of ground repeaters and transmitters, satellite-borne repeaters, transmitters and power supplies, information storage devices, signaling devices, guidance systems, and even orbital correction devices.

Obviously, all of these must function in proper sequence at the required time in such manner that one component will not prejudice the behavior or prevent the performance of another component. In this category of research ARPA requires contracts necessary to perform experiments with the complete system, and very often these experiments are made with interim hardware that contains the basic concepts but not the final design variation.

The system study type of research and development is often carried on simultaneously with the component development work.

The witnesses pointed out, in answer to our question, that a complete mill industry system is extremely expensive. System studies are conducted in order to assist with the selection and elimination of work which may no longer be of interest or value. In this category falls the conducting of studies comparing various types of space-borne power supply systems, studies of satellite communication systems, radar acquisition systems, and the data and decisionmaking systems.

Mr. Chairman, I must also say, along with Mr. Sisk, that this committee report obviously could not have been prepared in the manner in which it was without the full and complete cooperation of the staff.

The CHAIRMAN. Thank you, Mr. Quigley.

I think your report shows a tremendous amount of work, and the staff and the committee are entitled to credit.

Is that cleared for clearance as to security?

Mr. DUCANDER. Yes.

The CHAIRMAN. Then can we give that also to the press?

Mr. DUCANDER. Yes, sir.

The CHAIRMAN. If there are copies available, I would like them for the rest of the committee.

Mr. MOELLER. Mr. Chairman, I have a question off the record.

(Discussion off the record)

The CHAIRMAN. The committee will stand in recess.

(Whereupon, at 12:10 p.m., the committee recessed.)

MISCELLANEOUS REPORTS AND H.R. 7981

THURSDAY, JUNE 25, 1959

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met at 10 a.m., Hon. Overton Brooks (chairman of the committee) presiding.

The CHAIRMAN. The meeting of the committee will come to order.

This morning we have two short reports to take up and I think we should take them up first.

Mr. Anfuso has to leave a little later and so I am going to ask him to make a report at this time of his subcommittee.

REPORT OF HON. VICTOR L. ANFUSO, REPRESENTATIVE OF THE STATE OF NEW YORK

Mr. ANFUSO. Mr. Chairman, the subject of my report concerns the hearing on the Navy research and development held by Subcommittee No. 3. The Subcommittee on International Cooperation has held three hearings to date on research and development programs in the Department of the Navy.

In the course of these hearings eight witnesses have been heard representing the Office of Research and Development, the Office of Naval Research, the Bureau of Ordnance, the Applied Physics Laboratory of Johns Hopkins University, the Office of the Assistant Chief of Naval Operations for Development, the Office of the Assistant Chief of Naval Operations for Antisubmarine Warfare, and the Bureau of Aeronautics.

Since all of the witnesses testified in executive session the details of the hearings are classified and cannot be described in this memorandum except in general terms.

At the first hearing the subcommittee heard testimony on the overall research policies and programs of the Navy. The hearing was held in executive session in room 313, Old House Office Building, on Tuesday, June 9, 1959, at 10 o'clock, with the following members present: Mr. Anfuso, Mr. Fulton, Mr. Van Pelt, Mr. Mitchell, Mr. Daddario, and Mr. King. Vice Adm. John T. Hayward, Deputy Chief of Naval Operations for Research and Development, discussed current programs of weapons systems development. These programs involve applied—rather than basic—research. Admiral Hayward described briefly the Navy organization for the conduct of research, development, test and evaluation, the relation between the Navy Department, the other armed services including ARPA, the Office of the Secretary of Defense, and the NASA. Following this discussion, he summarized the fiscal year 1960 budget requested by the Navy in the

amount of $970,920,000. The admiral concluded his testimony with a detailed description of Navy missiles now under research and development, commenting on their progress and costs to date and their planned tactical use.

The next witness was Rear Adm. Rawson Bennett, Chief of the Office of Naval Research. Admiral Bennett's organization is responsible for the basic and supporting research programs of the Navy. In his prepared statement, Admiral Bennett gave several examples of basic research projects that had resulted in applications of great military value: for example, nuclear research leading to the *Nautilus* powerplant; research on the polymerization of nitrogenous compounds leading to solid fuel rockets such as Polaris; oceanographic studies which facilitated construction of the DEW line and made possible the transpolar submarine voyage of the *Nautilus;* upper atmosphere research preliminary to the discovery and analysis of the Van Allen radiation belt; and laboratory experiments on high velocity, highly heated gases, which have facilitated the solution of reentry problems.

Under questioning Admiral Hayward affirmed his belief that naval expenditures for research and development are inadequate. He said that in his opinion the Navy should "have roughly about 10 percent of our total budget in R. & D." One of the most interesting aspects of Admiral Hayward's testimony was his statement that more work should be done on components as opposed to weapons systems. He characterized basic research and component development as the "seed corn" of the research and development program. Both Admiral Hayward and Admiral Bennett testified that the Navy budget for basic research has not been substantially increased in real terms—apart from increases made necessary by higher costs—over a period of 10 or more years. Admiral Hayward then answered a series of specific questions concerning missiles and weapons systems.

The subcommittee met again in executive session on the following day at 9:45 a.m. in the committee hearing room, with the following members present: Mr. Anfuso, Mr. Fulton, Mr. Van Pelt, Mr. Daddario, and Mr. King. The principal witnesses were Rear Adm. K. S. Masterson, Assistant Chief of Naval Operations for Development, and Rear Adm. H. A. Yeager, Antisubmarine Warfare Readiness Executive. Mr. J. D. Nicolaides, Chief Engineer to Assistant Research Director for Astronautics, Bureau of Ordnance, gave a briefing on a current classified Naval astronautics program. He was followed by Dr. R. Kershner, Applied Physics Laboratory, Johns Hopkins University, who answered detailed questions as to satellite orbits and applications. Admiral Masterson then described the Navy's guided missile program, laying particular emphasis on missiles which are now in the planning state or under research and development. A very interesting, highly classified briefing on the problems and possible techniques of antisubmarine warfare was given by Admiral Yeager, assisted by Captain Sheldon H. Kinney.

At noon the subcommittee adjourned to reconvene in executive session in the committee hearing room at 2 p.m., with Representatives Daddario and Fulton present. Mr. Daddario presided, in the absence of the chairman. The only witness was Rear Adm. L. D. Coates, Assistant Chief of the Bureau of Aeronautics for Research and Development; he was accompanied by Rear Adm. K. S. Masterson, Assistant

Chief of Naval Operations for Development. The testimony dealt with the development program in Naval aviation involving air weapons systems for antisubmarine warfare, air attack, air defense, and amphibious operations and support. Admiral Coates agreed to furnish for the record the answers to a number of written questions.

The foregoing paragraphs summarize the hearings on Navy research and development held by the subcommittee to date. It is intended to recall Vice Admiral Hayward, probably on June 30, to give further testimony on the external research and development program of the Navy, particularly as to research projects which are being carried out abroad by foreign individuals and organizations under Navy contracts. It is further intended to develop certain points which were brought out in his classified testimony. The subcommittee wishes to compliment the Navy Department for its cooperation in preparing detailed statements and in making highly qualified witnesses available.

The CHAIRMAN. That is an excellent report. Do you move its adoption by the committee?

Mr. ANFUSO. I move its adoption.

The CHAIRMAN. There is no objection and it is adopted.

I have this in mind I might say for the members of the committee. We are investigating the possibility of getting all four committee reports and consolidating them into one manuscript, perhaps with a full committee report, because we had some hearings before the matter went to the subcommittees. We will put them in one binder so that the Congress and the country may have access to these reports.

All of these are good reports. This is an excellent report. It shows you have done a lot of work on it.

(Whereupon, the committee proceeded to further business.)

The CHAIRMAN. We have a report of a subcommittee. Mr. Teague sent us word he was delayed getting down here but would be here before we concluded. Since the report is drawn up and approved by the chairman of the subcommittee I think it would be appropriate to have counsel for the subcommittee present the report to the full committee at this time and if there is no objection, Mr. Yeager, we will call on you for this.

Following this I want to go into a very short executive session of the committee. So if the witnesses who came here this morning do not wish to stay for the reading of the report, we will understand it and they can go if they wish.

Mr. YEAGER. Yes, sir, this is a short report, Mr. Chairman.

REPORT OF HON. OLIN E. TEAGUE, REPRESENTATIVE OF THE STATE OF TEXAS, PRESENTED BY PHILIP B. YEAGER, SPECIAL CONSULTANT TO THE COMMITTEE

REPORT NO. 2, SUBCOMMITTEE ON SCIENTIFIC RESEARCH AND DEVELOPMENT

Subject: Research and development programs, Department of the Army.

Subcommittee No. 2 was assigned the task of studying research and development programs being conducted by the Department of the Army, as well as possible research programs by this service for the future.

The subcommittee met on 2 days, June 18 and June 19, with the following members participating in the hearings: Mr. Teague, chairman, Mr. Wolf, Mr. Baumhart, Mr. Karth, Mr. Bass, and Mr. Moeller.

On June 18, the subcommittee heard from Lt. Gen. Arthur G. Trudeau, Chief of Research and Development for the Department of the Army, who provided an overall picture of the Army's efforts in the research and development area. This included both basic and applied research. General Trudeau was a remarkably powerful witness and made a deep impression on the subcommittee by virtue of his frank discussion of—

1. The reasons for the American lag in certain research and development areas;

2. The difficulties in overcoming bureaucratic vetoes of research and development ideas;

3. What the Department of the Army considers to be a relative scarcity of money available for its research and development programs.

On June 19, the subcommittee heard testimony from:

Brig. Gen. William T. Ely, Director of Research, Department of the Army.

Maj. Gen. William W. Dick, Jr., Director of Special Weapons, Department of the Army.

Brig. Gen. Frank H. Britton, Director of Development, Department of the Army.

Dr. Per R. Frolich, Chief Scientist, Chemical Corps.

Dr. Roy B. Power, Chief Scientist, Department of Ordnance.

Dr. Ralph G. H. Siu, Chief Scientist, Quartermaster Corps.

The above witnesses were accompanied by:

Lt. Col. W. C. Willmann, Office of the Chief, Army Chemical Corps.

Mr. C. R. Woodside, Financial Advisor, Office of the Chief, Research and Development.

Witnesses also provided the subcommittee with slides and films which dealt mainly with some of the more recently developed "hardware" being produced by the Army's Special Weapons Branch.

Since a good deal of the Army's research and development program in regard to missiles, rockets, and other astronautical devices had already been presented before the full committee, the subcommittee did not endeavor to give special emphasis to these phases of research and development. However, the astronautical field was carefully reviewed and additional attention was then given to the other phases of the Army's research and development programs. These additional fields included the basic and applied research being conducted by the Army Medical Service, the Chemical Corps, the Corps of Engineers, the Ordnance Corps, the Quartermaster Corps, the Signal Corps and the Transportation Corps.

The subcommittee felt that, in the time available, it received a fair presentation of what the Army is doing in research and development, how it is going about that task, and what its major basic problems are. In spite of the quality of this presentation, the subcommittee also felt that much valuable information could not be given in the 2 days of open session and thus agreed to receive further testimony during an executive session to be held at a later date.

Army witnesses, including General Trudeau, also felt that an executive session would be a desirable and useful procedure.

In view of the very recent date of completion of the open hearings and in light of an executive session, now scheduled for July 1, the subcommittee is not prepared at this time to draw any firm conclusions or make specific recommendations to the full committee. It is expected that such conclusions and recommendations will be subsequently drawn up to be included in the full committee's final report on all military research and development being conducted, or contemplated, by the Department of Defense.

Olin E. Teague, chairman.

The CHAIRMAN. That is a very fine report, and on behalf of the committee I move that the report be accepted.

I may say this: Mr. Teague was tied up initially by his Committee on Veterans' Affairs and could not get to these hearings until the following week. I sat in on some of those subcommittee hearings myself and they were excellent. If there is no objection, the report will be accepted by the full committee.

(Whereupon, the committee proceeded to further business.)

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MISCELLANEOUS REPORTS AND H.R. 7981

WEDNESDAY, JULY 29, 1959

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met, pursuant to notice, at 10 a.m., Hon. Overton Brooks (chairman of the committee) presiding.

The CHAIRMAN. The committee will please come to order.

Admiral, before you start, my colleague, Mr. Miller, has a very short report to make on an inspection that his subcommittee made recently.

Mr. Miller, if you will.

REPORT OF HON. GEORGE P. MILLER, REPRESENTATIVE OF THE STATE OF CALIFORNIA

Mr. MILLER. On Friday, May 29, 1959, the chairman of the Bureau of Standards Subcommittee, in company of John A. Carstarphen, Jr., counsel, inspected several installations of the Bureau, including a field inspection trip to the Gaithersburg, Md., property which is the proposed relocation site for the Bureau.

We were met and accompanied on the tour by Dr. A. V. Astin, Dr. R. D. Huntoon, Dr. A. T. McPherson, and Dr. H. Birnbaum.

The inspection tour included visits to the laboratories dealing with various aspects of the fundamental standards of measurements. The Bureau conducts a continuous search for new and improved measurement processes to the end that as new areas of science and technology become active, new standards will be developed, adequate measurement methods established and new and appropriate calibration services can be provided.

The laboratories visited and the standards inspected included force measurements, radiation measurements, high temperature laboratory, standards of chemical composition, and length standards: Gage blocks and atomic beams. The Anechoic chamber and the reverberation chamber were also visited. Acoustics in both these rooms were demonstrated and their respective uses explained.

One of the more interesting aspects of the visit was the force measurements standards laboratory. Here in use is a 10-million-pound compression machine which is approximately 50 years old and still in use for measuring the effects of forces on building structures. Mr. Bruce Wilson, Acting Chief of the Mechanics Division, explained the use of this machine, together with calibrating rings which are capable of measuring compressions of 10,000 pounds to 300,000 pounds, and also resistance wire strain gage measurement system used for

measuring distortion. The laboratory has in use a deadweight machine with a capacity of 110,000 pounds. There is an urgent demand for force measurement systems in the missile and satellite programs, and it is necessary to develop systems capable of accurate measurements of thrust of experimental motors of more than 1 million pounds. To meet these requirements and those expected in the near future, the Bureau is designing and plans to construct deadweight testing machines of 300,000- and 1-million pound capacities.

The architectural drawings for the new site were reviewed and the laboratories to house these deadweight measuring standards are on first priority and will include a structure in excess of 100 feet in height required to house such a measurement system.

Another outstanding aspect of this field trip was the presentation of measurement and length standards under the direction of Dr. I. C. Gardner, Chief of the Optics and Metrology Division. He was assisted in the presentation by Mr. K. G. Kessler. The present standard of length measurement is the distance between two engraved lines on a platinum-iridium bar, but such lacks the reproducibility and availability that a fundamental measure should have. Consequently this department is investigating methods of producing an improved wagelength standard of length. Two approaches to this problem appear promising at this point. One is the atomic beam, which can be used either as an emission or an absorption, and the other is the Zeeman absorption filter. In the atomic beam device, used as an initial source, the Bureau has been experimenting with mercury as the atom and this is heated to a temperature of about 105° C. Atoms emerge from a slit in the oven, and those that are traveling in the desired direction pass into the interaction region. As the atoms pass through the interaction region they are subjected to an intense electron bombardment, which in turn establishes a constant length. This procedure gives results which ultimately, by a measurement of half-width lengths, is capable of giving resulting precision on the order of one part in a billion.

A discussion of the Gaithersburg site plans was led by Mr. Frank Waehler, architect of the firm of Voorhees, Walker, Smith, Mith & Haines, who showed and discussed site planning, preliminary drawings, explanation of the modular construction type laboratory proposed for the site, and the proposed administrative facilities. Seventy-two percent of the construction at the new site will contain technical divisions, 12 percent is for administrative facilities, and 16 percent for shops, warehouses, and other service areas. The placement of the buildings and the site planning is so designed that the said facilities can be expanded 100 percent for additional laboratory and technical space, and 50 percent for additional administrative facilities. The administrative building includes not only office facilities but also provision for a very large library, two auditoriums and a number of classrooms. The laboratory facilities are of the very latest and most modern concept for best utilization of laboratory housing facilities. The Gaithersburg site itself was visited, and this very attractive, approximately 500-acre site was found to be well drained, close to required utility facilities, highway approaches, and its site planning appeared to be very adequate.

Mr. Chairman, I submit the report to the committee.

The CHAIRMAN. A very excellent report, and I want to say this: I think it shows Mr. Miller is, by prior training, fitted for this type of an investigation, and it shows more than that, that he has a personal interest in it, and his committee has done a grand job there. And if there is no objection to it, the committee will adopt the report unanimously.

Mr. MILLER. I would say we should give some credit to Mr. Carstarphen, who was with me on the inspection trip and who worked on the preparation of the report. I would recommend that at the earliest possible time all of you visit the Bureau of Standards. People are working there in the field of measurements and in science and you will gain a great deal, learn a lot about it.

We talk about motors going to have a thrust of a million pounds. Today there is no way you can measure a million-pound thrust, and until you get this, we can't be definite as to what we are going to do in the field of missiles. This new machine will help bring that about.

The CHAIRMAN. It is a very fine report, and Mr. Miller is going to follow it up by personal inspection of some properties in Colorado.

Mr. MILLER. On the 14th of next month, the subcommittee invites any of you that want to go to visit the Bureau of Standards facilities at Logan, Colo.

The CHAIRMAN. The report is adopted.

(Whereupon, at 10:15 a.m., the committee proceeded to further business.)

MISCELLANEOUS REPORTS AND H.R. 7981

WEDNESDAY, AUGUST 26, 1959

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met, pursuant to call, at 10:05 a.m., Hon. Overton Brooks (chairman of the committee) presiding.

The CHAIRMAN. The committee will come to order.

This morning, before starting with the regular hearing, we have two or three committee reports that have been prepared and submitted to the membership of the committee.

Doctor, would you take up the ones that were submitted and when they were submitted to the membership of the committee. I will ask you whether or not we have had any opposition to any of these reports that have been circularized to the membership.

Mr. SHELDON. Mr. Chairman, a number of reports have been sent out on varying dates. There have been no objections to any which have gone out. The one which we urge be acted upon first, if it is the committee's pleasure is the one entitled "The First Soviet Moon Rocket."

The CHAIRMAN. When was that submitted to our membership?

Mr. SHELDON. It went out on Monday. It is very recent. The reason for requesting early action relates to some of the coverage which is expected in the public press if it is possible to make certain press deadlines.

The CHAIRMAN. Do you know of any opposition at all to that report? I read it. It is a very good report, too. It is an excellent report.

Mr. SHELDON. We have had no such reactions.

The CHAIRMAN. Do you have to have that deadline today or tomorrow?

Mr. SHELDON. About our only time to make the national magazines would be if it went out by noon today.

The CHAIRMAN. Well, I don't know of any opposition to it and as I say it is an excellent report. Our members should have had an opportunity to read it fully by that time and as is our practice, if there is objection they let us know right away.

Have you studied it, gentlemen?

Is there objection to it?

Mr. HECHLER. Mr. Chairman, on page 9, in the first full paragraph I was a little puzzled by the sentences here which revealed Mr. Mallan's past connections. I didn't quite understand the relationship between his past membership in certain organizations and his validity of reporter. I was simply raising the question as to whether the last

part of that first full paragraph was intended to imply that for those reasons, he had reported inaccurately in his article in True magazine.

The CHAIRMAN. Who wrote that?

Mr. BERESFORD. I did.

The intention was to give the reader pertinent information on the basis of which he could evaluate Mallan's motives bearing on his veracity.

Mr. HECHLER. The statement here "Under questioning, however, he admitted"—I am not challenging the facts, I am merely wondering about the interpretation.

Mr. BERESFORD. The "however" refers to the previous sentence saying there are three reasons given there why he may have been misled and then in addition to that it is possible that his motives were——

Mr. HECHLER. The implication is that he was serving the Soviet Union by reason of his past associations; is that the implication that you are drawing?

Mr. BERESFORD. That might be inferred; yes. That he may not have been misled but he may have been misrepresented, in other words.

Mr. HECHLER. I just hadn't recalled that the committee went into that very thoroughly.

Mr. KARTH. This was gone into by a subcommittee which I had the pleasure of being on and was quite thoroughly thrashed out for, I think, one whole afternoon.

I think that the connotation you place upon the language probably isn't true and perhaps it shouldn't be placed on it. It might erroneously be done, however.

I do think, however, that it was necessary for the subcommittee to bring out some of the things that were pertinent in his background just like it is for anyone else who appears before the committee and testifies. We would attempt to bring out their backgrounds.

Mr. HECHLER. To that I would certainly agree. I didn't understand the context of the statement in the middle of the paragraph, that is all.

Mr. KARTH. Mr. Chairman, there were some doubts in the minds of the committee as to his representation.

Mr. HECHLER. I withdraw my——

The CHAIRMAN. For the benefit of those who have just come in we have taken up this report entitled "The First Soviet Moon Rocket" which was distributed to the members of the committee and I think they have had an opportunity to read it. If there is no objection we can approve it, subject to any objection being filed within the immediate future.

I have studied it and found it an excellent report. Part of it comes from the subcommittee that we set up to study this, and members of the subcommittee are here at this time.

Is there any objection then to the report?

If not, it will be approved subject to release according to your release date?

Dr. SHELDON. The next report is the one entitled "Space Propulsion" which has been in the hands of the members for approximately 3 weeks. There has been no objection.

The CHAIRMAN. I have been especially interested in that report. I have studied that one very carefully. We had extensive hearings on that subject.

Are there any comments from the members as to that report or is there any objection to the report?

Mr. MARTIN. Who was the minority member of the subcommittee?

The CHAIRMAN. This was handled by the full committee. "Space Propulsion" was by the full committee.

Lieutenant Colonel Schuppener, together with Dr. Sheldon, drafted this report.

Colonel Schuppener, by the way, was loaned to us by the Department of the Army. He has left and he did a magnificent job here for the committee and we are grateful to him, and very appreciative of his help to the committee.

Mr. MARTIN. There were no objections when the hearings were held?

The CHAIRMAN. No objection.

If there are no objections it will be approved, then.

Now, the next one.

Dr. SHELDON. The third report is "Scientific Manpower and Education."

The CHAIRMAN. When was this given out?

Dr. SHELDON. This was given out on Monday.

The CHAIRMAN. I would suggest on this report because there is no urgency about it, that we consider it and we will carry it over until tomorrow morning and if there is no objection between now and tomorrow morning then we will release it.

Is that agreeable with the members of the committee? That has been in only since Monday and I want to give the members of the committee full opportunity to study the report.

Mr. YEAGER. I think it was distributed last Friday, Mr. Chairman, and the resolution which accompanied it was distributed August 8. This report was to accompany the resolution requesting the Science Foundation to make this study and report back.

The CHAIRMAN. Mr. Yeager was the member of the staff who compiled this report for us. He has done an excellent job, too. The only reason I suggest a carryover is because I hadn't completed my study of it.

If there is no objection, then we will carry it over until tomorrow morning. If at that time we have heard no objection from any member of the committee we will approve it then as a completed report.

(Whereupon, the committee proceeded to further business.)

MISCELLANEOUS REPORTS AND H.R. 7981

THURSDAY, AUGUST 27, 1959

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met, pursuant to adjournment, at 10 a.m., Hon. Overton Brooks (chairman of the committee) presiding.

The CHAIRMAN. The committee will please come to order.

The House convenes this morning at 11 o'clock and my thought is that we had better proceed.

We have this morning four reports. They are as follows: "Progress of Atlas and Polaris Missiles"; "The Dissemination of Scientific Information"; "Scientific Manpower and Education"; and "Research in the Department of Defense."

These four reports have been distributed to the members.

Doctor, when were these distributed? Can you give me the exact dates of each one?

Dr. SHELDON. Mr. Chairman, I don't know that I can give you exact dates. In most cases they went out either on Friday, or Monday of this week. I think in one instance——

The CHAIRMAN. Friday of last week or Monday of this week.

Dr. SHELDON. Yes, sir.

In one instance a report went out perhaps a couple of weeks ago.

The CHAIRMAN. That is Mr. Yeager's report—the one on scientific education went out 2 weeks ago.

Dr. SHELDON. I believe that went out last Friday.

The CHAIRMAN. It did?

Dr. SHELDON. Yes, sir.

The CHAIRMAN. I thought he told me it went out earlier.

We will interrupt the proceedings later on this morning when more of our members are here and take up these reports. My thought is that, those which simply were distributed for study on Monday, we will approve them subject to any opposition or suggested change that may be made within the next week's time. In that event, those who haven't had a full opportunity to study the reports will be able to get in any suggested changes before they are released.

If any changes affect the thought of the reports at all we will then, of course, have to contact all the members and give them the new changes as suggested by some member and let them dispose of it according to the wishes of the committee.

Mr. HECHLER. Mr. Chairman, possibly in next year's proceedings could we have these in mimeographed form? It somewhat inhibits members to suggest changes when they are already printed.

The CHAIRMAN. I don't think that you should feel that way, Mr. Hechler, about suggested changes. The committee print is always subject to change. Don't feel any hesitancy. If you feel there is something in there that should be changed, don't hesitate because I am going to suggest a change in one of these this morning. The committee print is in effect a mimeographed copy, which is subject to change.

Before they go to the printers they are studied carefully by our staff. As a rule I get a galley sheet and I go over that carefully, too. But, of course, in the amount of reading to be done in these reports, nobody is perfect and we can all overlook something that should be attended to. But all of that is done prior to the time that they are set up as a committee print. Then you get it as a committee print and if you have any suggested changes don't hesitate to let the committee know and we will give them consideration. We might in that event take them up with the staff and find out the reason for the original print and then if their reasoning doesn't hold water, if you are not satisfied with it, the committee can then pass judgment on the whole matter.

Mr. HECHLER. Thank you, Mr. Chairman.

The CHAIRMAN. I will wait a little while to take these up because we will have more of our members present.

(Whereupon, at 10:07 a.m., the committee proceeded to other business.)

REPORTS

The CHAIRMAN. Mr. Fulton, may I interrupt just a moment for this purpose? Before you came in I mentioned the fact that we have several reports which have been circularized among the members of the committee, and since this may be the last committee meeting we have before adjournment, these ought to be acted on at this time.

There is, for instance, the report "Progress of Atlas and Polaris Missiles" which has been given the members of the committee. We have the report "Dissemination of Scientific Information," which also has been given the committee.

There is the "Scientific Manpower and Education" report which was given the committee, and the report on research and development in the Department of Defense; and I might say the last is simply a summation of the reports of the subcommittees which were presented to the full committee, and all of them have been approved by the full committee.

Now, if there is no objection, while we have the members present I would like to get these approved, subject to the fact that—Doctor, which are the two that were given the committee only this week?

Dr. SHELDON. I can't give you definitive answers to which reports went——

The CHAIRMAN. The point is, if there is any objection from anyone within the next 5 days, we will reopen the matter and work out the objection.

Mr. FULTON. Might I have an inquiry on the last report—on its designation?

The CHAIRMAN. Yes.

Mr. FULTON. I had wondered when I read it if it might not be called "basic and applied research and development in the Department of

Defense," to distinguish it from weaponry systems, which is not the function of our committee.

The CHAIRMAN. The gentleman caught the same idea that I had. My thought there was "scientific and astronautic research." However, whichever you wish to use as a title for the last report——

Mr. FULTON. I think you could say "basic."

The CHAIRMAN. Wait a minute. You are referring to research and development in the Department of Defense.

Mr. FULTON. Yes.

The CHAIRMAN. Is there any objection to placing that addition to the title, there: Basic——

Mr. MILLER. I so move.

The CHAIRMAN. If there is no objection, it is so ordered.

On this one, research and development—that is the one I referred to.

Mr. FULTON. You can put the word "astronautics" in there, too.

The CHAIRMAN. It might be a good idea to include "astronautics," because it was with the idea of astronautic research.

If there is no objection, that change will be made.

Subject to that, if there is no objection from members of the committee in the next 5 days, the reports will be released as approved by the committee.

Mr. DADDARIO. Mr. Chairman, I have some questions then as to the "Dissemination of Scientific Information." Perhaps I could take those up with the staff?

The CHAIRMAN. All right, if you will. If it isn't worked out satisfactorily; let us know and then we will adjust that.

Mr. DADDARIO. Fine.

The CHAIRMAN. Pardon the interruption, Mr. Fulton.

(Whereupon the committee proceeded to further business.)

MISCELLANEOUS REPORTS AND H.R. 7981

THURSDAY, AUGUST 6, 1959

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
Washington, D.C.

The committee met, pursuant to call, at 10:45 a.m., Hon. Overton Brooks (chairman) presiding.

The CHAIRMAN. The committee will come to order.

Gentlemen of the committee, yesterday the committee tentatively approved the Anfuso bill. I think everybody has had a copy of that. It was unanimously approved after two minor amendments.

Today, since we have a quorum here, I think we should take a vote on it.

Do I hear motion to approve the bill?

Mr. ANFUSO. May I be recognized before you do that?

Although the members unanimously voted for this bill yesterday, I believe our distinguished majority leader made a very valid observation.

Mr. MCCORMACK. Not an objection.

Mr. ANFUSO. No, but an observation, and I think his observation should be given consideration.

On page 2:

(d) The presentation award shall be made by the President by such ceremonies as he may deem proper—

I would stop right there as he suggested and strike out the rest of the words:

including attendance by appropriate Members of Congress.

I think that can be in the report if we wish to put it in, but not in the bill.

The CHAIRMAN. Any objection to that change?

If not, it is unanimously approved.

Mr. ANFUSO. I now move the adoption of the rule.

Mr. HECHLER. I second the motion.

The CHAIRMAN. The motion is made and duly seconded that the bill be approved and sent to the House for action.

All in favor make known by saying "Aye."

Opposed?

The "ayes" have it. It is unanimously approved and I will ask Mr. Anfuso to report his bill to the House of Representatives.

We are fortunate in having the majority leader here today and we will avail ourselves of the opportunity to ask him to make every effort to get the bill on the calendar.

Mr. MCCORMACK. I suggest you speak to the Speaker next week. I think you can get a two-thirds vote on this bill. You see, the suspen-

sion day is a very valuable day to chairmen of committees. Mr. Teague is aware of it and other chairmen. It is often helpful to get this quick action under suspension instead of going through the Rules Committee and so forth.

I would like to see it utilized more. I suggest you speak to the Speaker about putting it down for suspension, which will be a week from Monday.

The CHAIRMAN. We will take it up with the Speaker.

Mr. MCCORMACK. Otherwise you may not get it through this session.

The CHAIRMAN. We want to get it through the House.

Mr. ANFUSO. Thank you very much.

I want to again reiterate what I said yesterday, that I thank the chairman and all the members for the splendid cooperation on this bill and particularly the chairman for steering this bill in the fine form in which it is today.

The CHAIRMAN. Thank you, sir.

And we want to thank the counsel and those who assisted the counsel from the departments too in preparing the bill. They have done an excellent job.

Mr. Ducander, do we have copies of that report on research in chemical, biological, and radiological warfare?

Mr. DUCANDER. Yes, sir.

The CHAIRMAN. I think all the members have had a copy of the report on "Research in CBR."

Mr. Teague led a committee down to the biological plant in Arkansas, inspected the plant and all, and I know you, Mr. Teague, have had a chance to satisfy the committee.

If there is no objection to the report, I would like to bring it up at this time.

Mr. TEAGUE. Mr. Chairman, may I make one remark?

The CHAIRMAN. Mr. Teague.

Mr. TEAGUE. I am sure Mr. Moeller will agree with me that no one can appreciate this plant unless you see it. You just have to see the plant to appreciate it. You can't describe it.

The CHAIRMAN. You would recommend that the others who didn't see it go down there?

Mr. TEAGUE. Anyone who can possibly go should go and take a look at it.

The CHAIRMAN. I agree with you.

Mr. MCCORMACK. Briefly, what does the plant do?

Dr. SHELDON. Mr. Chairman, we may get into some classified information.

The CHAIRMAN. Is there anything you can say in open session?

Mr. TEAGUE. It is research on biological warfare. That is what it is.

Mr. ANFUSO. Where is it?

Mr. TEAGUE. Pine Bluff, Ark.

The CHAIRMAN. I want to say to the members of the committee that this report is a result of most painstaking effort—it was a hard report to write because so much material in this area is classified and can't be placed in a report. And then in addition to that, it required a great deal of thought and study to write the report.

I have read it over and I think it is an excellent report. I think it will be a credit to the committee. Is there any further discussion on it?

Mr. ANFUSO. I move its adoption.

The CHAIRMAN. Mr. Hechler.

Mr. HECHLER. On page 4 I was puzzled by the fourth full paragraph which is just a single sentence. It starts, "The Korean war did not use" should that be "casualty gases"?

Dr. SHELDON. That is a misprint. I am glad you caught that. That should be gases.

The CHAIRMAN. Where is that?

Mr. HECHLER. On page 4, the fourth full paragraph which is simply two lines which starts, "The Korean war did not use." Should that be casualty gases?

The CHAIRMAN. Gases is what it should be.

Without objection, of course, that correction will be made. You will attend to that, won't you, Doctor?

Dr. SHELDON. Yes, sir.

The CHAIRMAN. Is it possible, Mr. Ducander, to hold this and release this for Sunday?

Mr. DUCANDER. Yes, sir. That is what we intended to do.

The CHAIRMAN. You have heard the motion to approve the report as written. Is there any objection to the motion?

If not, it is unanimously approved. It is so ordered.

We have another bill here this morning which is really a committee bill. It is in my name, but it is the result of many hearings that this committee has had in the course of the past months. I have a short statement here with reference to it.

This is a bill, H.R. 7981, to provide—through a special ad hoc committee in the executive branch—for a study of the Nation's need for a complete up-to-date census of scientists, engineers, and technical personnel; to provide for a review of what has already been done in this direction by the various Federal agencies; and to provide Congress with recommendations for possible future legislation on this matter.

H.R. 7981 was drafted and introduced after extensive hearings on scientific manpower and education were held by this committee over a 4-month period. These hearings, although they covered a wide range of topics, indicated that one of the most difficult—but important—scientific problems facing the country today is the problem of keeping track of its scientific and technical personnel and anticipate where future scientific manpower needs may arise.

This is the reason for H.R. 7981.

The committee has already heard from a number of competent witnesses who have testified in favor of this, or similar legislation. This morning we have representatives here from the National Science Foundation who will be the final witnesses on the proposed bill. Following the testimony, it is my thought to consider the bill for final committee action. Prior to reading the bill for amendments, we will discuss several changes proposed by the staff and review certain pertinent facts involved in this general problem.

Now, I should like to ask Mr. William J. Hoff, General Counsel for National Science Foundation and Mr. Thomas J. Mills, Head of the Scientific Manpower Section for the Foundation, to proceed with their testimony.

Now, gentlemen, we have this bill before us and I know you have studied it because I have talked to you about it.

(The bill follows:)

[H.R. 7981, 86th Cong., 1st sess.]

A BILL To amend the National Science Foundation Act of 1950, as amended, to provide for an immediate study of the need for, the proper composition of, and the most efficient means of obtaining a continuous up-to-date national record of scientific and technical personnel throughout the United States

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the National Science Act of 1950, as amended, is further amended by adding a new section 3(d) as follows:

"(d) That there is hereby established a Committee on Scientific and Technical Personnel (hereinafter referred to as 'Committee'), to be composed of a Chairman appointed by the Director of the National Science Foundation and one member selected by the President from the Federal Council for Science and Technology and one member (to be selected by the head of his respective agency) from each of the following: The National Science Foundation, the Bureau of the Census, the Civil Service Commission, the Department of Defense, the Department of Labor, the Department of Health, Education, and Welfare, the National Aeronautics and Space Administration, and the Central Intelligence Agency."

SEC. 2. (a) It shall be the duty of the Committee—

(1) to make an intensive study of the need, both governmental and nongovernmental, for a permanent, comprehensive, and continually current record of scientific and technical personnel throughout the United States which will provide appropriate information on both the formal training of such personnel and their subsequent experience;

(2) to determine the type and kind of information which such a record could most advantageously supply and should be expected to provide;

(3) to determine in what manner and through what means such a record may best be maintained; and

(4) to report its findings and recommendations to the Congress not later than two hundred and seventy calendar days from the date of the enactment of this Act.

(b) the findings and recommendations referred to in paragraph (4) of the preceding subsection shall include (but not necessarily be limited to) the following:

(1) The probable cost of any recommended program.

(2) The estimated length of time which would be required to place an effective scientific manpower tabulation program in operation.

(3) Whether the best results could be expected through compulsory or voluntary means.

(4) What agency of Government should bear responsibility for the program, and whether that responsibility should be exclusive or merely primary.

(5) What agencies of Government should be expected to cooperate with the agency responsible for the program and the manner in which such cooperation should be carried out.

(6) What amendments, if any, to laws now affecting scientific manpower tabulations or registers should be made.

SEC. 3. In carrying out the functions specified in section 2, the Committee is authorized and directed to consult with the Federal Council for Science and Technology, and to obtain the views of such private individuals and organizations as the Committee deems appropriate as well as those of Government agencies not represented on the Committee but having specific interest in the program under study.

SEC. 4. For the purpose of effectuating this Act, each agency represented on the Committee shall furnish, upon the request of the Chairman, necessary assistance to the Committee as authorized by section 214 of the Act of May 3, 1945 (59 Stat. 134; 31 U.S.C. 691). Such assistance may include the detailing of employees to the Committee to perform functions consistent with the purposes of this Act.

SEC. 5. Upon the completion of its study and the submission of its report to the Congress as provided in section 2(a)(4), the Committee shall cease to exist.

STATEMENT OF WILLIAM J. HOFF, GENERAL COUNSEL, NATIONAL SCIENCE FOUNDATION

Mr. HOFF. Mr. Chairman, I believe our views have all been put before the committee and we are happy to be here today to answer any questions that any members of the committee may have, but I think the record contains all our views fully.

The CHAIRMAN. I think your views are that the purposes of the bill are satisfactory but you feel the legislation in itself is not necessary.

Mr. HOFF. We have full authority under this area not only under Public Law 507, the National Science Act of 1950, but also within the executive branch by arrangement as confirmed by the Bureau of the Budget.

The CHAIRMAN. Let me ask you this, sir, something that has mystified the committee. Why is it that the years have gone by and we don't have the program underway as it should be?

Mr. HOFF. Well, the question of whether we have done as much or more than we should have is another matter, but we have done quite a bit and Mr. Mills can explain that more fully. The register was started back in 1952 and has been proceeding along with studies as to the recommended coverage and means of doing this and the purposes which it would serve, along with manpower studies.

Now, of course, more could have been done and can be done but it is a question of relative emphasis on different things.

The CHAIRMAN. None of the witnesses has shown that the program has been completed. In fact, all of them who came before the committee said it had not been completed and most of them expressed disappointment, as I remember.

Mr. HOFF. Well, I don't think we could say the program is completed because the coverage and everything else connected with it is under study at all times and it has been expanded from year to year as well.

The CHAIRMAN. Tell the committee why it has not been completed in all of those years.

As I remember the law, there were three or four basic objectives placed in the law and this was one of them. The law was passed in 1950, and 9 years have gone by. This was simply to tabulate a census of societies and 9 years have gone by and there seem to be few results.

Mr. HOFF. I think we might explain what has been done. When I say the program hasn't been completed, what I mean by that is that changes will occur from time to time no matter how long it goes on and the program will never be completed in an effort to bring the program to a point where at any given time it will best serve the purposes for which it is intended.

However, we have expanded it, we have studied continuously whether it should be expanded further or not; changes in methods are being considered and I think Mr. Mills might explain just what the——

The CHAIRMAN. I might suggest this would be more orderly if Mr. Yeager, being counsel for the committee, could explain the present status of the proposed legislation.

Mr. TEAGUE. May I make one comment?

The CHAIRMAN. Surely.

Mr. TEAGUE. In your present report, isn't there a very complete two or three or four pages telling how much work has been done? I know I was impressed on the amount of work that has been done on this thing. I believe it was in your annual report.

STATEMENT OF THOMAS J. MILLS, HEAD OF SCIENTIFIC MANPOWER SECTION, NATIONAL SCIENCE FOUNDATION

Mr. MILLS. Each year we report progress in the annual report, and I believe two or three special reports have been furnished this committee and have been published as part of the hearings.

The CHAIRMAN. Mr. Yeager, if you could bring us up to date, I would appreciate it.

Mr. YEAGER. I was wondering, Mr. Chairman, if you would like me to put in the record the views of the Science Foundation which we received from them on this matter.

The CHAIRMAN. All right, if you would. I think this is very important.

Mr. YEAGER. When the committee completed hearings in this area and the bill was drafted, letters were sent to the 10 agencies involved who would become represented on the ad hoc committee, the interdepartmental committee, for any comment they might care to make.

Four did not reply. Six did reply. Of those six, four took essentially the same view which was that this was a worthwhile objective, but they felt that legislation would not be needed to accomplish the purposes.

The other two indicated that they were not certain as to whether it was necessary or not, but added that they would be very glad to serve on the committee if it were formed.

Incidentally, I think all agencies which replied expressed a desire to be represented on the committee in the event that the bill was passed.

The ones from whom we heard were the National Science Foundation, the National Aeronautics and Space Administration, the Department of Commerce, and the Office of Civil and Defense Mobilization. Those four indicated along the lines that I mentioned—that they felt this matter could be accomplished without specific legislation.

The Civil Service Commission and the Central Intelligence Agency indicated that while they were not certain, they would be very glad to serve on the committee, as did the others.

The reason for the bill essentially was this, that Congress has not had any specific review or recommendations on the matter reported back to them since 1950 when the Foundation Act was evolved, and by that I mean a total review with recommendations for possible legislation if that were needed. The sole objective of this bill is simply to ask that an interdepartmental study be made and that within a period of 9 months following the creation of the study committee that they report back indicating what they have found, what the needs are, and how they might best be obtained—and then make any recommendations which they felt might lead to new legislation or provide additional legislative guidelines for the carrying on of this register.

At the end of that time, the committee would cease to exist. No funds are involved in the measure; each representative agency would be able to stand its own part of the cost.

The CHAIRMAN. Now, when was the law passed authorizing that and what importance did the act place on this matter?

Mr. YEAGER. Are you speaking now of defraying expenses, Mr. Chairman?

The CHAIRMAN No, the original basic law that provided that this be one of its purposes.

Mr. YEAGER. This was in 1950, Mr. Chairman, at which time eight functions were laid out for the Foundation, of which four were for positive continuing programs. The others, for example, "to develop and encourage the pursuit of a national policy for the promotion of basic research," are general objectives certainly, but they do not seem to require a positive continuing, specific program.

One of the four was to "maintain a register of scientific and technical personnel and otherwise provide a central clearinghouse for information covering all scientific and technical personnel in the United States including its territories and possessions." This was enacted in 1950.

The CHAIRMAN. And it is because that—although 9 years have passed the register is not set up there.

Mr. YEAGER. The testimony, as reviewed, Mr. Chairman, by the staff, and I think members will recall, was to the effect that the register, as it is available now, is not satisfactory, and I believe that even the Foundation witnesses themselves indicated that they felt it left much to be desired.

I don't think there was any criticism intended at all at the working level or to suggest not enough had been done within the limitations imposed, but it appeared to be a question of the high-level decision—how fast to push this register and how far to fund it.

The CHAIRMAN. Are you finished, Mr. Yeager?

Mr. YEAGER. Except I have some questions I would like to ask the witness.

The CHAIRMAN. Go ahead and ask them.

Mr. HOFF. Could I reply now?

The CHAIRMAN. Let Mr. Yeager ask his questions and then you can reply to the whole.

Mr. YEAGER. I wanted to verify several facts from the previous record. I was wondering if you could tell me what position the manpower section occupies within the overall structure of the Foundation at the present time. Is it a major division, is it a section, is it an independent office? How does it fit in?

Inasmuch as the manpower program was one of the four major directives specified in the original act, how does it fit in at the present time?

Mr. HOFF. Shall I answer that before your next question, while I have it in mind?

Mr. YEAGER. Surely.

Mr. HOFF. In section 7 of the National Science Foundation Act, it was provided—

until otherwise provided by the Board there should be within the Foundation the following divisions:

(1) A Division in Medical Research,

(2) A Division of Mathematical Physical and Engineering Scientists,

(3) A Division of Biological Sciences, and
(4) A Division of Scientific Personnel and Education which shall be concerned with programs of the Foundation relating to the granting of scholarships and graduate fellowships in the mathematical, physical, medical, geological, engineering and other sciences.

In the organization of the Foundation, there was included within the Division of Scientific and Personal Education all the programs relating to manpower and scientific personnel as such. In this context, the register constitutes a program within the Division of Scientific and Professional Education.

Mr. YEAGER. How many sections are there in that division?

Mr. HOFF. Maybe Mr. Mills can answer that.

Mr. MILLS. There is one on institutes; there is one on curriculum improvement, one on fellowships and one on special projects; so there are four in addition to the scientific manpower program.

Mr. YEAGER. It is one of five, in other words?

Mr. MILLS. That is correct.

Mr. YEAGER. Would you tell me if I am correct in this: The records indicated that for 1960 the Science Foundation plans to spend something like $400,000 on the register, about $500,000 on the technical and manpower studies and perhaps another $100,000 on basic research. Is that correct as you recall it?

Mr. MILLS. That is correct. The amount for the register was $400,000 in programed funds and by programed funds we mean amounts that will be spent through the professional societies and through the Records Center.

The $100,000 you mentioned in basic research is really intended to be $100,000 for research in reporting techniques in the scientific and technical manpower program area.

Mr. YEAGER. And the total budget approved by the President this year for the Science Foundation was $160,300,000, is that roughly correct?

Mr. MILLS. I think that is correct.

Mr. YEAGER. So the register itself accounts for less than three-tenths of 1 percent of the total budget, roughly?

Mr. MILLS. Yes.

Mr. HOFF. Yes.

Mr. YEAGER. As I understand it, two reviews were undertaken in 1958, one by a task force set up at the request of the President or the Bureau of the Budget, and one set up in response to requests from private industry and from the professional associations themselves.

The latter report which I understand was submitted to Dr. Kelly, the Chief of your Division, in November last year, summarized as follows:

The review panel recommends special efforts be made to put the already-collected information into usable and up-to-date form so that the Foundation and others will have an opportunity to assess the value of an actual functioning register. The panel further recommends that the staff of the Foundation come to agreement upon basic register policies with respect to scope and purpose. The panel recommends that until these two steps have been carried out, plans for extending the scope or enlarging the funds of the register be held in abeyance.

I was wondering if you would care to comment on that and indicate what the differences were within the Foundation staff as to procedure, and if those have been reconciled?

Mr. MILLS. I think I might comment this way:

First, with respect to the two reviews that are mentioned. One review was made by a panel at the request of the Foundation itself. A special advisory panel was convened to review simply the register and I believe the recommendations which you just read were the recommendations of that panel.

The other review which took place was a more comprehensive review and dealt rather with the general area of what kind of information is needed with respect to scientific and technical personnel.

In this connection, it made some incidental recommendations on the register, but its recommendations were considered broader than simply dealing with the register itself.

Returning to the recommendations of the first panel which was set up by the Foundation itself, it is true that it recommended that the operation be brought up to date and that data be made available more promptly from it.

I believe the Foundation has accepted this general recommendation. I think there is indication of this acceptance in the fact that the funds spent on the register in fiscal year 1959 are nearly double what they have been in previous years. The request in the President's budget for 1960 continues at about this level.

As far as the operation is concerned, some of the steps which have been taken to speed up the processing include such things as amending upward the contract with North Carolina State College, where our processing is performed. We have taken over new and expanded quarters there; we have arranged to have more processing machinery there and our plan is to complete the analysis of the materials now in the register this year. We then plan to turn to a recirculariza tion in the spring of 1960 to bring up to date present registrations and secure additional registrations.

I don't know that that answers all your questions, but if you will restate them, if I haven't covered them, I will try to answer them.

Mr. HECHLER. This is a tremendously important issue and due to the fact that the witnesses are testifying that there is legislative authority already for this activity, one wonders if it wouldn't accomplish the objective if the committee would instruct the staff to prepare a report on the importance of this up-to-date national record of scientific and technical personnel as well as its findings on the progress.

In that way it would express the sense of the committee and perhaps not make necessary the passage of legislation. I just throw that out as a suggestion.

The CHAIRMAN. It is tremendously important and I will say this, the staff has worked very, very hard on it and I think even the National Science Foundation will tell us that it is tremendously important. Yet 9 years have passed and they have not completed a program which is one of the eight basic portions of the act.

Mr. HECHLER. I simply raise the question whether a committee report would not have the same effect.

Mr. HOFF. I would like to address myself for a moment to the status of the program.

The Foundation Act was passed in 1950. The Foundation itself was not an operating concern for over a year after that. The first appropriation for the whole Foundation was, as I recall, $300,000.

It was fiscal year 1952 before the Foundation was under way in any way at all, really.

The register at the time was being maintained in the Office of Education. One of the very first things that was done—when I say one of the very first things, it was a year later; it was May 1952—studies were made as to what the role of the Foundation should be in running the register and in 1952 the register was taken over.

From that time until today it has been under constant review, has been constantly studied and has been constantly expanding. So that I would like to reiterate that while I think many people may feel more should have been done, and done more quickly, others may have felt that even what was done was too much under all the circumstances.

Certainly it is a program that will never be finished because it will have to change with changing needs and changing opportunities in terms of scientific organization.

The CHAIRMAN. Would you say you are completed now?

Mr. HOFF. I would say with the exception of the big issue as to whether all engineers should be covered by the register, it is a very high percentage.

Mr. Mills, I am sure, can be more specific on that.

Mr. MILLS. We estimate—of course, no one knows the exact figures on numbers of engineers or scientists in this country; this depends on your definition to a large extent. However, we estimate there are about 300,000 people who qualify as professional scientists in the natural sciences.

The CHAIRMAN. How many do you esimate should be qualified on that list?

Mr. MILLS. On that basis of our present standards of coverage, we have estimated 250,000 might be covered. Of this number, we have about 175,000 now.

The CHAIRMAN. You are about 100,000 short there on 250,000.

Mr. MILLS. 75,000 or so.

The CHAIRMAN. You are a little better than 50 percent. Possibly 65 percent.

Mr. ANFUSO. Do you object to the principles of the bill H.R. 7981?

Mr. HOFF. No, sir.

Mr. ANFUSO. Do you object to the establishment of a committee on scientific and technical personnel as contemplated by the bill?

Mr. HOFF. The word "object" is a little stronger than I would use. We do feel that this is something that we have as a responsibility, that we are studying the matter and that the legislation is therefore unnecessary.

We have all the authority and we also have the will to try to see what should be done. Now, there will always be differences of opinion as to what should be done but we are studying it, we have contracts out with professional societies studying particular angles and so forth and perhaps we should do it with a little more emphasis, but this is something that we have very much in mind.

Mr. ANFUSO. I am sure no criticism is intended, but perhaps the passage of such a bill might aid you in accomplishing that which you have tried to accomplish in the last 8 or 9 years.

Mr. HOFF. I would personally think that Mr. Hechler's suggestion would be a very good way of giving us the prod, if you want, and also

of indicating the Congress' view on this matter which would give us guidance in going ahead.

The CHAIRMAN. Let's see if we can agree on this: You agree that the basic objective of this bill is all right. You go along with it. That is, the accomplishment of the register. That is what I mean.

Mr. HOFF. The basic purpose of the bill, as I see it, is to decide what exactly the register should do and how much should be done about it. With that, we are in complete agreement.

The CHAIRMAN. Yes; and why it has not been completed to date.

Mr. HOFF. With that, Mr. Chairman, I personally—I think maybe we have a little semantic difficulty.

The CHAIRMAN. What I am leading to is this: My colleague here, Mr. McCormack, has a very valuable suggestion to this effect: Since four of the agencies have said they have authority, and two of the agencies are uncertain about the authority, therefore, out of six agencies that we contacted, two of them are uncertain as to whether or not the authority exists in law for you to go ahead with this thing.

Mr. YEAGER. Perhaps I didn't make myself clear. What they were saying was that they felt the legislation was not necessary, that the same results could be obtained strictly through Executive action and the legislation would not be necessary for that reason.

None of them questioned that authority now exists within the Foundation to do the job.

The CHAIRMAN. That is what I had intended to express there.

Now, Mr. Hechler and Mr. Anfuso have both suggested an alternative, a committee report. What would you think of this:

Suppose this committee took this bill and approved it as a committee resolution, asking you to give us a report on January 3 when Congress convenes, as to what progress you have made and what additional help you need?

What would you think of that?

Mr. ANFUSO. January 30?

The CHAIRMAN. Well, the day Congress convenes.

Mr. HOFF. I would say we would be happy to proceed with it. I think that perhaps a bit longer time would be in order because January 3, by the time you get anything organized, is a short period indeed.

The CHAIRMAN. Well then, the only difference between us would be whether it be January 3 or February 1, or something of that sort. It is just a date.

Mr. HOFF. I want to be sure that I am making myself understood.

Mr. MCCORMACK. What date did you have in mind?

Mr. HOFF. I would think the middle of March would be much more realistic as a figure for getting anything really done.

I would assume the committee report would merely call attention to its views as to the importance of the subject and ask for a report as to what more the Foundation felt should be done in this area and how.

The CHAIRMAN. And what additional recommendations, if any, that you would have to make.

We are not here to frame a critical report, but merely to assist in this worthy objective—at least I think it is a very worthy objective, and the committee spent weeks on this thing.

Mr. SISK. Mr. Chairman.

The CHAIRMAN. Mr. Sisk.

Mr. SISK. As I understand this problem, of course, it will be a continuing problem, in perpetuity—I shouldn't even use the word "problem"; it will be a continuing process.

With new people coming in and deaths occurring, make it a changing problem.

Mr. HOFF. That is correct; and it is changing in terms of areas of science and everything else.

Mr. SISK. When we speak of completion of the program, there will never be a completion.

Mr. HOFF. There will never be a completion.

Mr. SISK. Let me ask you this then, to try to get to the core of it: What would you consider to be an equitable register on a percentage basis, or have you given this any thought?

For example, if we assume that we will have an average of 300,000—and I am pulling this figure, of course, out of thin air, but if we assume that we have an average of 300,000 people who would normally be on this register, what percentage would you think at any given time would be doing a good job in this field?

Would you say if that register indicated 60 percent, 90 percent, 70 percent of, let's say, the fluctuating total—I don't know whether I am making my question clear or not, but I realize this is not a job that can be completed in the sense that you are going to—at any given moment—have every individual who should be on the register at that time. That is going to be impossible, is it not?

Mr. HOFF. That is correct, and I would like to ask Mr. Mills to answer that in a moment, but I would like to make the obvious observation and that is the question of—I am not talking of the individual engineers now, but with regard to the scientists themselves—the problem of what percentage of coverage you get is also a question of how much effort everybody—I am not talking about the Foundation, but I mean the societies and the scientists themselves should put into it because, of course, when you go up from 70 percent to 99 percent, the percentage between say 98 and 99 is terrifically hard to get, but I would like to defer to Mr. Mills to answer that.

Mr. MILLS. I think this a matter of what you want to use the register for and how much money do you want to put into it.

You can never get 100 percent coverage but you could get pretty close to 100 percent coverage if you wanted to spend enough money to do that. I question whether it would be worth while to try to get that far. Your last 4 or 5 percent would be extremely expensive and it may not be worth while.

Speaking now from the standpoint of normal peacetime conditions, under which you think of the main use of the register being to provide information on our scientific and technical personnel resources, I would think that 80 percent to 90 percent is probably pretty good coverage and for most purposes this is enough.

Now, if we start thinking about possible emergency uses under a mobilization situation, perhaps, of some character, you may want to step this up and you may want to put the necessary money into it to step it up to, say, 90 percent to 95 percent.

I don't think under normal conditions this is necessary. I think 80 percent to 90 percent is probably pretty good.

Mr. SISK. Now, what percentage do you feel you have then at this moment?

Let's assume then that 85 percent would be a good record, year in and year out.

Now, where do you stand today?

Mr. MILLS. We have about 175,000 out of an eligible list of 250,000. Now, I guess I can do a little arithmetic on this or maybe someone else can beat me to it.

The CHAIRMAN. Well, we can figure that percentage.

Mr. HOFF. It is 70 percent.

Mr. SISK. In other words, you feel there are some gains to be made. At least a gain of 10 percent to 15 percent in order to get this register into what should be considered good shape?

Mr. MILLS. Now, this is in the field of science, sir. This does not speak with respect to engineers.

The CHAIRMAN. If the gentleman would yield, you are not in that good shape with the engineers?

Mr. MILLS. No, sir.

The CHAIRMAN. I might add this: Some of our witnesses have said that your registrations are not usable because they are not complete and you are tabulating some of those, are you not?

Mr. MILLS. I think perhaps the difference between the scientific register and the engineering register may not be as clear as it should be.

Let me say first in the area of science we are trying to get something in the area of the 80 percent we were talking about. We are trying to get a high coverage of scientific personnel. We have never really set the objective to get a similar coverage in the area of engineering.

Now, there are many reasons for this: When we started in the register business, when our first review was made, the emphasis was put upon a selective registration rather than a complete registration. Perhaps this was in error, but this was the advice we got from the scientific and engineering community.

When we pressed the matter of engineering, the advice we got from our advisers in the engineering profession was that we should not seek anything like a complete registration in the engineering field, at that time.

Rather than that, our advisers stated perhaps our best bet would be what we call a finder's list. The finder's list is not an effort to get a complete registration; rather, it is an effort to go to selected engineers and solicit their assistance so that if you need to get advice on particular projects or recommendations with respect to particular personnel you can go to this group and they have agreed that they will provide you with this kind of advice.

This is what we have in the area of engineering at the present time.

We have about 20,000 engineers who have been recruited through the Engineers' Joint Council, names largely taken from "Who's Who in Engineering." These people are contacted about every 6 months. These people have agreed that if called upon they will produce recommendations with respect to other individuals to use on particular projects or they themselves will provide advice on engineering projects.

So this is what we have in engineering.

Now, let me add to this that the attitude of the engineers themselves has undergone some change within the past year and a half and at

the present time we have a contract with the Engineers' Joint Council to look further into the matter of the desirability and the feasibility of a more complete registration of engineers.

This is where we stand at the present time.

Mr. McCormack. How many engineers do you estimate?

Mr. Mills. We estimate there may be as many as 850,000 engineers of professional status.

Mr. McCormack. Does that include engineers in the field of applied science?

Mr. Mills. Yes. This would be generally your mechanicals, your electricals, your civil, your chemical engineers, and all of the traditional engineering professions.

The Chairman. You have how many? 20,000 you say?

Mr. Mills. We have 20,000 who are on the finder's list. Again this will not produce any statistics on the characteristics of the engineering population. All this is is a group of people we feel we can go to and they are agreeable to providing advice if we need it.

Mr. Sisk. Actually you have never attempted then to take a census, so to speak, and establish a register of engineers as such at all, but have simply concentrated on securing this group of what you might call advisers or counselors to whom you could go for information as to where to get a required number of men with the special skill needed. Is that basically correct?

Mr. Mills. This is correct, except I might say this is changing now with advice from the profession that this ought to be looked into.

We have a contract with the Engineers' Joint Council which is committed to produce a report within a year, probably in about June 1960 as to what this group, at any rate, feels should be done in this area.

Mr. Sisk. Thank you, Mr. Chairman. That is all I have.

Mr. McDonough. Mr. Chairman.

The Chairman. Mr. McDonough.

Mr. McDonough. Would some specific questions in the 1960 census be of any value in adding to the information you already have?

Mr. Mills. Yes, they would.

Let me say for the last several years there has been a question in the decennial census which gets at this matter of numbers and we are quite aware of the figures which have been produced in past decennial censuses. Currently we are providing a small transfer of funds to the Bureau of the Census to see what might be done about improving the count of engineers. It has been subject to some criticism and it is our hope that the 1960 census count of engineers will be improved or at any rate we will be in a better position to interpret it after that.

Mr. McDonough. What type question would you have in mind?

Mr. Mills. Well, the type question which is presently asked is what is the occupation of each individual in this household.

Now, the problem on that is that the word "engineer" comes readily to one's tongue and there is not any very good definition as to what is meant by "engineer."

Currently we are reviewing some of the schedules which were used in the current population survey, which is similar to the census, where individuals have answered this question of what do they do. Those who reported they were engineers have been questionnaired again to find out what their educational background was and what were they actually doing which would qualify them as engineers.

Now it is our hope that when the results of this analysis are available it will enable us to make some recommendations to census procedure to improve their account.

Mr. McDONOUGH. You would want to know if they were graduate engineers?

Mr. MILLS. This is one question.

Mr. McDONOUGH. And then another thing we want to know, are they practicing their profession. They may be graduate engineers and not practicing their profession.

Mr. FULTON. Every one of these engineers must be qualified to practice in certain areas. For example, the States have certificates. Why couldn't you find from the States the number of people and their places of business or residences, qualified to practice in these various fields of engineering first? And in order to keep it up to date, if you would keep track of the engineering students, maybe, and watch them as they came through, you would have a pretty good lead-in as to what your future register was going to look like, and you would have a lead-in of students where if you needed to track some people down later and wanted to find where they were, that would be a finders' list for you.

How about those two things?

Mr. MILLS. We, of course, keep track of the numbers of engineers coming out with degrees each year. We have very good information on that, collected by the U.S. Office of Education.

Mr. FULTON. What percentage do you get?

Mr. MILLS. I am sorry, I don't understand. What percentage?

Mr. FULTON. What percentage of the total of graduate students in engineering do you have through your sources available each year?

Mr. MILLS. Well, we know the total numbers coming out.

For example, there are about 35,000 coming out but these people don't get on the finders' list. They don't get on the finders' list until they are pretty well established as engineers. They come in through "Who's Who in Engineering" for the most part and one doesn't get into "Who's Who in Engineering" until he has several years' experience.

Let me comment on this licensing provision, however: There are relatively few engineers who are licensed. It is not required in many States except with respect to very specialized engineering fields. For example, your civil fields typically do require licensing, but on the other hand your mechanicals, your chemicals, your industrials, many of these do not require it.

We have looked into this. I don't have a figure available on what proportion of the engineers are licensed engineers, but my guess would be that it is perhaps 20 percent.

Mr. FULTON. Do you get cooperation from the States in that field?

Mr. MILLS. I think we could.

Mr. HALL. With respect to licensing, whether or not they are licensed, most of them have a privilege tax, those who are practicing engineering as a profession, do they not?

Mr. MILLS. This is not true, I think, of employees, is it? Most engineers are employees.

Mr. HALL. If a tax is imposed it would be for the privilege of practicing your profession. It wouldn't matter how you practiced it,

whether you did it in a firm, whether you did it individually, or whether you worked for a corporation on a salary.

Mr. HOFF. One thing there with regard to being a practitioner, or being in a firm or anything like that, that is one thing; but quite another is the job classification and abilities of people who are called engineers in industry. They may or may not be licensed or graduate engineers, but still they may have the skills that you would want to have on the register. So that I believe that a large percentage of what would be covered in a complete itemization of all engineers today are nongraduate engineers who have transferred over in industry and are performing some or more engineering functions.

I don't think that the two things are coextensive at all.

Mr. MCDONOUGH. Your most reliable source for a practicing engineer, I should imagine, is the society membership.

Mr. MILLS. This is the main reason we work through the societies in trying to establish registers in these areas.

I think it is true also of the scientific side with respect to their people.

Mr. MCCORMACK. It has come to be customary practice to call the fellow who puts the record on the turntable in a radio studio an engineer. The announcer says, "My engineer is putting on a rock and roll record."

He isn't the kind of engineer you are looking for.

The CHAIRMAN. The manager of a building too is also the engineer. "We'll send the engineer up."

Mr. MOELLER. I would like to ask the witness just one question: Is there any facet at all in this bill that would help to expedite your work? Any one facet?

Mr. HOFF. I think my only answer to that is that we have the complete authority to do anything provided for in the bill. I would like to add one thing which is tangential to your question, but in coming up with recommendations now, one of the important building blocks in this process will be the report from the Engineers' Joint Council on this contract and that won't be due until next June. Therefore, on this big issue of the coverage of the engineers themselves, anything before next June would be without benefit of that report, and this is the type of problem you get into in establishing a deadline.

Mr. HECHLER. I would like to stress again the urgency of this issue. This committee has spent a lot of work and devoted a lot of attention to this issue and I was a little disturbed by your remark that you could not give us a progress report until the middle of March. Could I ask you to explore that a little further?

Mr. HOFF. What I had in my mind was in setting up new committees and so forth that always takes time. It is now August. Before you can choose a committee and go through everything that is necessary before getting them in the flesh, it will be well into the autumn. By the time the committee goes to work and has subcommittees and reports and you collect information and debate things, I just felt that January would result in a crash job and not necessarily a completely thought-out one. I realize the desire of the committee to get on with this fast, but I do point out on the other side the length of time that these things take.

Now, I don't know whether the Engineering Joint Council's report could be speeded up any.

Mr. HECHLER. I would like to point out that this is the type of problem which might necessitate a crash job.

The interest that I have in seeing something done before January and having something done in January rather than March is that between January and March civilization might be destroyed. I think this is a problem that we will all have to be aware of a sense of urgency on.

The CHAIRMAN. Are there any further questions?

Mr. FULTON. The question comes up when we are under such far-reaching and important national programs involving our security, based on engineering, Is the time yet here when there should be a national qualification for various kinds of engineers?

Maybe we ought to have a national qualification for engineers, because from what you say, I am very surprised about the engineering field. Just hang up a sign, call yourself an engineer, and there you are.

Mr. SISK. Would the gentleman yield?

Mr. FULTON. Yes.

Mr. SISK. The name "engineer" doesn't mean anything. I was just thinking, for example—and this is no reflection on the organization—I mean we have engineers of every kind in the world and I mean it is a nice name—apparently people like the name.

I am thinking, for example, of a very fine organization, I might say, which is the operating engineers. It is a big union, an international union of operating engineers. They in there are rated as engineers, men who squirt an oilcan on a piece of machinery on a dredger, or something. I just use that as an illustration. Those, of course, are not the people with whom you are essentially concerned in this instance. There is no reflection on the people because certainly they are valuable to their job, but I think this idea of scientists and specialized engineers, if you are going to make up a register, will have to be spelled out very carefully with some definite definitions as to what type engineers we are talking about when we speak of national security and our need.

Mr. MCDONOUGH. A graduate engineer would certainly limit it from the class we are talking about, those that you spoke about, the operating engineers.

Mr. SISK. I appreciate that, but graduate engineer itself, again, would not necessarily mean too much.

Of course, we think of civil engineering as being a tremendous field and yet electrical engineers, in many cases can be a graduate engineer and still not be of much worth to this register.

Mr. HOFF. There is the other side of it too, and that is that I believe over a third of all engineers are not graduate engineers today although this percentage is changing.

Mr. FULTON. For example, the Congressman from California here could qualify as a congressional chemical engineer and maybe the Congressman from Ohio could qualify as the Reverend Congressman Moeller, Bible engineer.

Mr. DADDARIO. He may have trouble getting clients though.

Mr. FULTON. What we are bringing up is that there should be some limitations pretty definitely set and then we need some kind of standards set.

Mr. HOFF. This is part of the problem that we are trying to work out. We are doing some of that now, but this needs refining and so forth all the time.

Mr. FULTON. That brings up my next point: Why isn't that necessary under the resolution? Why aren't we accomplishing, by this resolution of the chairman's, arrival at these results where you say you have adequate authority? We would set up machinery interdepartmentally which gives us a fresh approach and helps us arrive at some of these things that we sort of made fun of.

Mr. HOFF. To answer that from the state of my knowledge, I think there are a lot of different places in the organization of engineers—to just stick on that—where we can go for advice. It isn't necessarily all going to come from the Government by a long shot although we certainly aren't going to overlook that.

Mr. FULTON. This fills the field out and gives us another area where we would get assistance. Even though you might think you have enough, and so therefore, when it is adding something extra on, we would ask you isn't it worth while to have extra assistance such as this?

Mr. HOFF. Let me answer that: We do have some governmental people on our committees now. We can expand that, and I think the point is if you feel we don't have the right kind of committee and want to set what it should be, of course, that is one thing, but we have the authority to have any type of committee like this that we want.

Mr. MILLS. Let me add to that if I might, a development which is quite recent. One of the materials furnished to this committee was the document "A Program for National Information on Scientific and Technical Personnel" as I recall.

This was done at the request of the Bureau of the Budget and was turned over to them. Since then the Bureau of the Budget has requested the Foundation to take responsibility for developing the program, that is an interagency Government program to produce the kind of information that that report calls for.

Now, one of the items—and the Foundation has accepted that assignment—one of the first things the Foundation will have to do in my opinion in meeting this responsibility is to organize an interagency advisory committee.

Now, many of these agencies which you name here are agencies which should be on that committee.

The CHAIRMAN. Now, why did you take 9 years to get around to that?

Mr. MILLS. Well, sir, the report was prepared for the Bureau of the Budget and transmitted to the Bureau of the Budget this last fall and the request that we take this responsibility—that is, the responsibility of becoming the focal agency in developing this program, came to us simply this spring.

The CHAIRMAN. Why was that delayed? I think that is what is disturbing the committee. Here 9 years have gone by and now you recommend an interdepartmental committee. I think that is really what is disturbing all of the members of the committee.

Mr. MILLS. Of course, sir, so it won't be misunderstood, we have had interdepartmental committee advice prior to this time. I am simply pointing out that here is something else which has come along

very recently in the whole broad area of scientific and technical manpower information which I think would probably go beyond——

Mr. HOFF. If I may add just one word to that, it seems to me this is—again, as I say, maybe we haven't moved as fast as we should.

On the other hand, this is part of a logical development that started 9 years ago and is continuing to grow and spread all the time. This is just one more step and by no means the last.

The CHAIRMAN. I think this is one of the first things the committee took up in January and this is one subject I think the committee does know about.

If we are going to do anything today it would seem to me that in working with the Department I can see their viewpoint there, but as a matter of fact, 9 years have passed and they haven't accomplished what the committee generally would like to see them accomplish. They say give them until March 15. I am perfectly willing to do that, although that sounds like a long time.

Instead of putting through the bill, as has been suggested here by several members of the committee, Mr. Counsel, could we reframe that in the form of a committee resolution which we could approve today and back it up with a report on the resolution incorporating the ideas that have been expressed here in the committee today?

Mr. DUCANDER. Yes, sir, we can.

The CHAIRMAN. We could set up a date. March 15 would be acceptable with these gentlemen. Some members of the committee would like to see it sooner. I personally would like to see it sooner, but if we can work in harmony and they will bring a program here that is complete that we can work on by March 15, I personally would go along with them.

Mr. SISK. Well, Mr. Chairman, what are we going to expect of these people at March 15?

Certainly I don't think we can expect them to have, let's say, an engineers' register anywhere even well started by that time. I question that we are going to be able in that short period of time to see much improvement over the 70 percent on the other basis.

Now, what are we expecting on March 15?

The CHAIRMAN. It was my thought that we would take this bill and ask them, for instance, to set up their program, with a classification for engineers. All right. What are they going to do with engineers? Come back here on March 15 and tell us what the program is, what they need in the way of manpower, then what they need in the way of money, what their objectives will be in regard to time and so forth?

Mr. SISK. They would be directed to report back on March 15 or such other date as might be set, and explain what they have decided to do in the way of definite procedures in one, two, three order?

The CHAIRMAN. And what they need in the way of legislation, if any, money, if any, assistance of any kind they need. Outline a definite program and give us a target date that we can shoot at for being complete.

Mr. HOFF. I am afraid I gave that March 15 date and I would like to just say this, that we will be happy to give you our views as of any date. But the question remains that no matter what date we take it is still always going to be interim because this is always going

to change. And what I pointed out a minute ago, the big issue this morning as I sense it is the engineers. Well, as far as the engineers are concerned, we have this large study being done by the Engineers' Joint Council which won't be in until next June, so anything we do in March still would have to be very tentative and await the results of that survey.

The CHAIRMAN. May I say this to the counsel now: It would seem to me—for instance, certain types of chemists you might want to enroll, there might be 98 percent of those, but you have no program to give the committee. On engineers you ought to have a program there where you say "All right, we don't want to enroll railroad engineers," for instance.

Mr. HOFF. We can do this at any time, tell you what our present program is, what we are looking into, and what we see as the problems for the future.

All I am saying is that I think I would be derelict if I gave this committee the impression that by January or March or any other specific date we could lay down a definitive program because——

The CHAIRMAN. You are evidently indicating you can do that earlier than March 15.

Mr. HOFF. I think we could meet the January date in the line of telling you what help we need as of the moment, telling you where we are, what we are investigating, and so forth, but this is a different type of thing than coming up with "This is what we believe it is."

Mr. SISK. Mr. Chairman, I certainly would not oppose such a resolution. I think it is fine.

The thing is, of course, these people are prepared this morning—they are outlining their program as of this morning. Now, I suppose they could come back in September and again report on that program and they are going to report in January on this program and such new proposals as they have.

The point I am making is, I don't know how effective this is going to be. If I understand it, based on the dollars and cents you have and personnel you have, you are doing the best you can.

Mr. HOFF. Yes, sir. I certainly agree with that.

Mr. SISK. I am not saying we have done enough. Don't misunderstand me, Mr. Chairman, and I am not attempting to defend these gentlemen. On the other hand, I think we should have a clear understanding of what is to be expected whether it be January 15 or what it is. It seems to me that if we want to spell out something that they are to report back on at that time, as I understand it you would then desire they report back on, after having made some studies here in the next 4 or 5 months, how much more money they need, how much more personnel they need——

The CHAIRMAN. And how many engineers they have been able to register and how long will it take them to complete the program and what engineers, what type they would use, and all of that.

It is spelled out pretty well in the bill, and let me say to the gentleman from California: They are not giving us their program now. They have done it already.

We have had them up here before, months ago, but what we were disappointed in is that they have not yet conceived a program that is thorough and down to date.

Mr. MCDONOUGH. You mean a procedure to follow?

The CHAIRMAN. Yes. They don't have the definite program as to what they want to do.

Mr. SISK. I hate to belabor the question, Mr. Chairman, but as I understand here they have explained a procedure they have set up where they are making a study, where there is to be a report back here in June in this coming year on the problem with reference to the manpower program for engineers.

Now, I don't see how—do you propose between now and the time that report is in that you can do anything further in the way of registering engineers?

Mr. HOFF. No. We don't have the money for that among other things now and it takes quite a while to do it.

You are making the same point I have been trying to make which is that we can report at any time but nothing will be definitive and it never will be definitive because I hope we won't cast ourselves in concrete and say, "This is it and no changes are going to affect us."

One of the milestones I pointed out was that next June we would have this report from the Engineers' Joint Council which would give us a big step forward.

If you want to know our views and recommendations in the meantime, of course, we will be happy to give them to you, but no matter what date you pick, it is always going to be unfinished business and we will never have a completed program because times will change.

The CHAIRMAN. Just like the census isn't completed. You take another one later.

Mr. HOFF. But, Mr. Chairman, what I mean is, we will always keep reexamining what it is worthwhile to do. What it is worthwhile to spend on this. How to improve the descriptions of the engineers' categories, for instance, and ways and means of getting it up to date and how it can best be used.

This is a continuing job and I hope will always continue to develop. I think it has developed over the last few years. As Mr. Mills mentioned we doubled the amount of money just last year, and maybe you'd like us to go faster and maybe we should go faster, but as of any time we will give you our best views as of that moment, but please don't think that these are our final views because they are bound to change.

Mr. SISK. Now, you are going to be down here to present your budget—we will have their budget authorization, will we not, before this committee? Is that correct or not?

The CHAIRMAN. No, we don't get it before our committee.

Let me say to the gentleman too, they haven't been down here asking us for more money for their program. That was one of the troubles there. They were substantially satisfied with the money they got.

Mr. Anfuso.

Mr. ANFUSO. I don't think you have to belabor the point any longer. I think there is a meeting of the minds here. You have agreed that, even earlier than March, say as soon as Congress comes back in January, say about January 3 or 5, supposing you give us an outline of procedure and program that you intend to follow, and in that you tell us about the engineering report which is to be had in June.

Put that all down and let's review that and then we will decide what action to take at that point.

Mr. HOFF. That is what I had in mind, sir.

The CHAIRMAN. Would you wish to put that in the form of a committee resolution to ask them to do that?

Mr. ANFUSO. I think direction on your part at this point would be sufficient.

Mr. MCDONOUGH. Do you think you have sufficient authority to do all that is necessary between now and January 5 to make a report to us?

Mr. HOFF. Oh, yes, certainly.

Mr. ANFUSO. That is all that is necessary.

The CHAIRMAN. The only thing is the committee resolution would get a report also from the other agencies who might likewise be interested in recommending something.

Mr. HOFF. I am sure we will have no trouble in getting their views.

Mr. HECHLER. Mr. Chairman, I think there would be a lot of force to a committee resolution along those lines and I would like to make a motion such a committee resolution be drafted along the lines of this bill and also supplemented by a committee report calling upon these agencies for a progress report to be submitted at the reconvening of Congress in January, 1960.

Mr. ANFUSO. I think that will do it.

I second that.

The CHAIRMAN. You have heard the motion duly seconded—I think we know the problem there.

All in favor of the motion of authorizing our committee—we are fortunate to have an able staff member here to do the work for us—to draft an appropriate resolution for submission to the committee calling upon the Department to submit to us on the first day of the convening of the next session of Congress, a schedule of its program on this subject—substantially—I am not trying to read into my remarks what the resolution should contain, but covering this general subject.

Mr. HECHLER. To clarify that, both the resolution and the committee report.

The CHAIRMAN. Supplemented by a committee report.

Mr. DADDARIO. It seems to me we are proposing to pass a committee resolution asking these people to do what they are already doing, and that they are prepared at any time whether now or next January, to submit to us. It seems to me we are going beyond that particular point.

The CHAIRMAN. The only thing is, they have been 9 years in getting to it.

Mr. FULTON. Along those lines, Mr. Daddario, I think the resolution itself must be written more specifically and I would recommend that Mr. Yeager give us the type of resolution, and secondly, it is certainly not a department, whatever it is.

Mr. HOFF. Agency.

The CHAIRMAN. That is correct.

You have heard the question. All in favor of——

Mr. FULTON. I would rather hold that until we get the specific resolution.

Mr. ANFUSO. We are just agreeing on how the resolution will be drafted.

The CHAIRMAN. All in favor will make it known by saying "Aye."

Opposed?

The "Ayes" have it.

It is unanimously carried.

May I say that Mr. Yeager will handle this matter for the committee and let me ask all the members of the committee who have ideas on this subject to communicate with our staff member there and give him your ideas so that the staff will have the benefit of everything that is worth putting in the resolution.

Without objection then, the committee will stand adjourned.

(Whereupon, at 12 noon, the committee adjourned, subject to call of the Chair.)

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